



Australian Government
Department of Defence

DEPARTMENT OF DEFENCE
DEFENCE OPERATIONS MANUAL
(OPSMAN 1)

**VISITS TO AUSTRALIA BY NUCLEAR-POWERED
WARSHIPS**

EDITION 10

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FOREWORD

1. This publication has been prepared for the Australian Department of Defence in consultation with the appropriate Australian Government departments, through the standing interdepartmental committee, the Visiting Ships Panel (Nuclear).

2. Edition 10 supersedes Edition 9 of December 2010, which is to be destroyed.

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Read Admiral, RAN

Chairman Visiting Ships Panel (Nuclear)

7 December 2016

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CHAPTER 1

INTRODUCTION

References:

- A. *Intervention in Emergency Situations Involving Radiation Exposure*, Radiation Protection Series 7 (RPS 7) ARPANSA 2004
- B. RB – NPW - 66/00 2000 Reference Accident to assess the suitability of Australian Ports for visits by Nuclear Powered Warships
- C. Environmental Monitoring Handbook for visits by Nuclear Powered Warships – Part A
- D. Radiation Monitoring Handbook for Visits by Nuclear Powered Warships
- E. 1989 Senate Report on contingency planning for the accidental release of ionizing radiation

Purpose

1.1 The purpose of this document is to prescribe the conditions, procedures and responsibilities for the conduct of visits to Australia by nuclear-powered vessels, particularly nuclear-powered warships (NPW).

Background

1.2 Port visits to Australia by naval vessels of friendly nations, and reciprocal visits by ships of the Royal Australian Navy, are one of the most visible aspects of the defence cooperation between Australia and other countries in peacetime. These naval vessels may be conventionally or nuclear-powered. Ship visits are made with the approval of the Australian Government.

1.3 Because of the nature of NPWs propulsion plants, special procedures have been adopted to ensure that the safety of the general public is maintained during visits by such vessels.

1.4 These procedures include Conditions of Entry and the arrangements for visits, as well as contingency arrangements in the unlikely event of an accident resulting in the hazardous release of radioactivity to the environment.

1.5 The nature of these requirements necessitates that responsibility for the conduct of these procedures is shared between Australian Government and State/Territory Governments. Australian Government responsibility is generally for international negotiations, prescribing guidelines and approving and arranging visits within those guidelines. State/Territory responsibility is generally for the establishment and conduct of the safety organisation during ship visits.

1.6 The Australian Government requires contingency arrangements to be in place at all Australian ports visited by NPW and also requires that there be the capability to undertake radiation monitoring of the port environment. These arrangements are formulated to cover two potential release mechanisms, which are failure or malfunction of radioactive waste control systems within the vessel and an accident involving the reactor plant.

1.7 To cover the unlikely event of a reactor accident in an Australian port the Australian Government requires a guarantee of absolute liability from visiting nations. Under US Public Law 93–513 it is policy to accept liability on an absolute basis for nuclear damage, which results from an accident involving the reactor of a US warship. The UK and French Governments have provided a unilateral assurance to Australia on nuclear reactor liability comparable to that given by the US. Other nations will be required to provide similar assurances prior to approval being given.

CHAPTER 2

ORGANISATION

Introduction

2.1 The Australian Government has established an interdepartmental standing committee called the Visiting Ships Panel (Nuclear) (VSP(N)) to control arrangements for visits to Australia by nuclear-powered warships (NPW) and other nuclear-powered vessels.

RESPONSIBILITIES

Visiting Ships Panel (Nuclear)

2.2 The responsibilities of the VSP(N) are to:

- a. advise the Minister for Defence on proposals for NPW visits;
- b. develop and maintain procedures related to NPW visits;
- c. generally oversee the implementation of specific arrangements, especially safety requirements, for visits by NPW;
- d. maintain and oversee safety arrangements for visits by nuclear weapons capable warships; and,
- e. validate/invalidate all NPW ports on advice from the Technical Working Group of the Visiting Ships Panel (Nuclear).

VSP(N) Technical Working Group (TWG)

2.3 The Technical Working Group is responsible to the VSP(N) for providing advice and support in accordance with the Terms of Reference at Annex A to this chapter.

MEMBERSHIP

VSP(N) Membership

2.4 The Panel is constituted of representatives from:

- a. **Department of Defence:**
 - (1) Head Navy Engineering (Chairman);
 - (2) National Port Services Organisation (Secretary);
 - (3) Maritime Operations (DDMARCOM)
 - (4) International Policy Division
 - (5) Defence Science and Technology Group; and
 - (6) Joint Health Command.
- b. Australian Nuclear Science and Technology Organisation (ANSTO);
- c. Australian Radiation Protection and Nuclear Safety Agency (ARPANSA);
- d. Department of the Environment
- e. Department of Health; and
- f. Attorney General's Department, Emergency Management Australia (EMA AGD).

Technical Working Group

2.5 The Technical Working Group (TWG) comprises of representatives from:

- a. ANSTO,
- b. ARPANSA,
- c. EMA AGD, and
- d. RAN.

Invited Membership

2.6 Representatives from the following departments may be invited to attend VSP(N) meetings:

- a. Department of Prime Minister and Cabinet, and
- b. Department of Foreign Affairs and Trade.

Annexes:

- A. TWG Terms of Reference
- B. TWG Standard Operating procedures

VSP(N) TECHNICAL WORKING GROUP**TERMS OF REFERENCE****Introduction**

1. The VSP(N) Technical Working Group (TWG) is the business arm of the VSP(N) and provides advice and conducts support to the VSP(N) in accordance with paragraph 4 below.
2. The TWG will conduct business under the authority of the VSP(N). The TWG holds no executive authority and will forward all recommendations to the VSP(N) for approval.
3. Travel or other financial requirements for the TWG members will be funded by the members parent organisations/departments on a self funded basis.

Aim/Objective

4. The role of the VSP(N) Technical Working Group is to provide advice and support to the VSP(N):
 - a. on technical issues related to radiation and nuclear safety to support visits to Australian ports by nuclear powered warships;
 - b. on radiation and nuclear safety technical assessments on Australian NPW ports;
 - c. on assisting the States/Territories in reviewing and exercising their port safety plans and arrangements for NPW visits against OPSMAN 1 requirements;
 - d. in conducting assessments and validations of potential NPW ports;
 - e. in conducting revalidation of NPW ports;
 - f. on the suitability of NPW ports; and
 - g. in reviewing OPSMAN 1 (OPSMAN 1 should be reviewed every 18 months or after significant changes such as incident or organisational changes);

Membership

5. The following organisations form the TWG:
 - a. ANSTO;
 - (1) Radiation Protection.
 - b. ARPANSA;
 - (1) Radiation Protection and Nuclear Safety.
 - c. EMA AGD; and
 - (1) Operations Planning.
 - d. RAN.
 - (1) National Port Services.

VSP(N) TECHNICAL WORKING GROUP

STANDARD OPERATING PROCEDURES

References:

- A. 1989 Senate Standing Committee on Foreign Affairs and Trade report on visits to Australia by Nuclear Powered or Armed Vessels
- B. ARPANSA assessment RB-RAR57/05 dated Dec 05
- C. ARPANSA RPS Number 7 dated 10 Nov 04
- D. ARPANSA Technical Report on Environmental Monitoring Handbook for Visits by Nuclear Powered Warships Part A dated May 06
- E. RB – NPW - 66/00 2000 Reference Accident to assess the suitability of Australian Ports for visits by Nuclear Powered Warships

Introduction

1. The VSP(N) Technical Working Group (TWG) is the mechanism whereby the Visiting Ships Panel (Nuclear) complies with the requirements laid down by the Australian Government in the administration of visits by Nuclear Powered Warships (NPW). These Standard Operating Procedures (SOPs) describe the roles and responsibilities of the member organisations and provides a consistent methodology for the conduct of the TWG.

Background

2. The guiding document that details the visit requirements is the Defence Operations Manual (OPSMAN) 1. This document is sponsored by the VSP(N) and provides the mandated procedures to provide support for visits by NPW's.

The Technical Working Group

- 3. The VSP(N) Technical Working Group comprises of representatives from the:
 - a. Australian Nuclear Science and Technology Organisation (ANSTO);
 - b. Australian Radiation Protection and Nuclear Safety Agency (ARPANSA);
 - c. Attorney Generals Department, Emergency Management Australia (EMA AGD); and
 - d. Royal Australian Navy (RAN).
- 4. The role of the VSP(N) Technical Working Group is to provide advice and support to the VSP(N):
 - a. on technical issues related to radiation and nuclear safety to support visits to Australian ports by nuclear powered warships;
 - b. on radiation and nuclear safety technical assessments on Australian NPW ports;
 - c. on assisting the States/Territories in reviewing and exercising their port safety plans and arrangements for NPW visits against OPSMAN 1 requirements;
 - d. in conducting assessments and validations of potential NPW ports;
 - e. in conducting periodic revalidation of NPW ports;
 - f. on the suitability of NPW ports; and

- g. in reviewing OPSMAN 1 (OPSMAN 1 should be reviewed every 18 months or after significant changes such as an incident or organisational change);

Responsibilities

5. The responsibilities of the members of the Technical Working Group are:

- a. Australian Nuclear Science and Technology Organisation;
 - (1) provide at least one member to the TWG;
 - (2) provide specialist advice on radiation monitoring and countermeasures supporting port safety plans; and
 - (3) provide support as detailed in OPSMAN 1.
- b. Australian Radiation Protection and Nuclear Safety Agency;
 - (1) provide at least one member to the TWG;
 - (2) provide specialist advice on radiation protection and nuclear safety for radiation emergency preparedness, response and recovery,
 - (3) provide support as detailed in OPSMAN 1.
- c. Attorney Generals Department, Emergency Management Australia; and
 - (1) provide at least one member of the TWG;
 - (2) provide advice on exercising and planning
 - (3) provide advice on Australia's emergency management arrangements
 - (4) provide liaison role with State/Territory; and
 - (5) provide support as detailed in OPSMAN 1.
- d. Royal Australian Navy.
 - (1) provide one member to the TWG;
 - (2) provide professional advice on maritime aspects of NPW visits;
 - (3) coordinate the publication of port validation reports; and
 - (4) provide support as detailed in OPSMAN 1.

CHAPTER 3

CONTROL OF ENTRY AND BERTH ASSESSMENT

DEFINITIONS

Primary port

3.1 A primary port is a validated port for visits that can support a visit of longer than two hours duration and requires all conditions of entry to be met. Primary ports have been classified as either Tier 1 or Tier 2. A Tier 1 Primary Port is a port that receives regular visits, that is a visit at least at a biennial frequency. A Tier 2 Primary Port is those ports that receive fewer visits than a Tier 1 Port. These classifications are used by the Technical Working Group to determine the re-validation program and the effective and efficient use of limited resources. It has no impact on the ability of these ports to host NPW visits.

Secondary port

3.2 A secondary port is a port that has been assessed and validated for visits of less than two hours duration. These visits are usually classified as a "Stop and Go" visit, an example being a boat transfer serial or medical evacuation (Medivac). The conditions of entry are detailed at paragraph 3.4 below. All primary ports can also support Stop and Go visits.

CONDITIONS OF ENTRY

Primary ports

3.3 Visits are only permitted to Australian ports, which have been assessed and approved as suitable in terms of strict Australian environmental and safety criteria. Conditions of entry to Australian ports by visiting NPW have been established by the Australian Government. Approval of visits is subject to satisfaction of these general conditions, which are:

- a. visits will be for purposes such as medical emergency, crew rest and recreation, exercise briefings and preparations, embarkation and disembarkation of logistics associated with operations and normal voyage repairs and not for nuclear fuel handling or repairs to reactor plant (necessitating breach of reactor containment);
- b. visits will be subject to satisfactory arrangements covering liability and indemnity, and to provision of adequate assurances relating to the operation and safety of the warships while they are in Australian waters;
- c. movement of vessels must take place during daylight hours under conditions where visibility is not less than three-quarters of a nautical mile;
- d. navigational controls on other shipping will be applied during the time that NPW are entering and leaving port;
- e. there must be a capability to remove the vessel, either under its own power or under tow, to a designated safe anchorage or a designated distance to sea as soon as possible within the time frame specified for the particular berth or anchorage, and in any case within 24 hours and two hours for NIMITZ class, if an incident should occur;
- f. an operating safety organisation, competent to conduct a suitable radiation monitoring program and able to initiate actions and provide services necessary to safeguard the public in the event of a release of radioactivity following an accident, must exist for the port being visited; and
- g. Marine environmental sampling is to be conducted. The marine samples are to be forwarded to ARPANSA for analysis in accordance with Annex B to Chapter 3.

Secondary ports

3.4 Visits classified as "Stop and Go" defined at paragraph 3.2 above are subject to the following conditions of entry:

- a. visits will be purposes such as medical emergency, boat transfer of personnel for exercise briefings and preparations, embarkation and disembarkation of logistics;
- b. visits will be subject to satisfactory arrangements covering liability and indemnity, and to provision of adequate assurances relating to the operation and safety of warships while they are in Australian waters;
- c. movement of vessels must take place in daylight hours under conditions where visibility is not less than three-quarters of a nautical mile;
- d. navigational controls on other shipping will be applied during the time that the NPW is entering or leaving port;
- e. a radiation monitoring team comprising of one person equipped with a portable radiation detector located on the shoreline in proximity of the transfer position; and
- f. post visit marine sampling is to be conducted as soon as possible after the visit. The marine samples are to be forwarded to ARPANSA for analysis in accordance with Annex B to Chapter 3.

3.5 Due to the short notice of the visit and short duration of the visit and due to the low risk of a reactor incident occurring there is no requirement for a full radiation monitoring organisation to be employed. Acceptance of visits under these conditions is applicable to current classes of NPW. Additional conditions may be applied on a case by case basis.

BERTH ASSESSMENT

Introduction

3.6 Suitability of particular alongside berths and anchorages is determined by the VSP(N) Technical Working Group (TWG) in consultation with appropriate State/Territory authorities.

3.7 Specific alongside berths and anchorages in certain Australian ports have been assessed as suitable for use by visiting NPW. These assessments have been made with respect to the radiological consequences on the population of a Reference NPW Accident in the light of the constraints imposed by the Conditions of Entry. As specific port safety arrangements are predicated on the use of these designated locations (in particular radiation monitoring and environmental sampling), no berth or anchorage is to be used by an NPW unless approval is given by the VSP(N), nor are alternative locations to be used without such approval.

Basis of the assessment

3.8 The assessment of suitability is based on consideration of radiation safety factors for each berth and anchorage, including estimates of the individual and collective radiation doses to the public in the event of a Reference NPW Accident. These dose estimates are used to determine:

- a. On the basis of the affected population, if it is feasible to plan to protect individuals at the intervention levels specified in ARPANSA publication RPS7— *Recommendations on the Intervention in Emergency Situations Involving Radiation Exposure* [3], and
- b. whether the assessed effective doses are acceptable.

The specific sized planning zones for protective measures applies for all berths and anchorages, based on the particular class of nuclear powered warships and for the applicable removal times. However, the assessment of the collective radiation dose to the population surrounding a berth or anchorage depends on the particular berth or anchorage being considered.

Reference NPW Accident

3.9 The Reference NPW Accident is a loss of coolant accident that results in the melting of the fuel in the reactor core and the release of volatile and gaseous fission products to the reactor containment. These fission products would then be available to leak to the atmosphere and dispersed according to the prevailing weather. In the assessment the dispersion of released fission products in the atmosphere downwind of the accident has been estimated using a standard, conservative meteorological model and the radiation doses to individuals and to the total population exposed have been calculated.

3.10 Little technical information is available to Australian authorities on the reactors and associated plant of NPW. In particular, no information is available on fission product inventory or engineered safety features such as emergency core cooling, fission product containment or clean up systems.

3.11 The assumptions, methodologies and the radiological consequences are fully described in the Reference NPW Accident (The 2000 Reference Accident Used to Assess the Suitability of Australian Ports for Visits by Nuclear Powered Warships).

3.12 For the purposes of emergency planning it is considered that the Reference NPW Accident represents a conservative upper limit of potential radiological risk to the public. From information available it has been estimated that the probability that such an accident would occur during a four or five-day visit to port would be less than one in a million per reactor per year.

3.13. The assumptions, models and parameters used in the Reference NPW Accident have been selected to ensure conservatively high estimates of individual and population doses.

Emergency Planning Zones

3.14 Emergency Planning Zones for the implementation of protective measures are designated around NPW berths and anchorages for planning purposes, to ensure that appropriate protective actions can be taken promptly and effectively in order to optimise protection in the event of an accident.

3.15 The Precautionary Action Zone (PAZ) is an area close to the NPW within which protective measures will be implemented automatically upon notification of a reactor accident. Authorities should be able to exercise full control over all persons within the PAZ and, if an emergency should arise, it should be possible to quickly evacuate the PAZ. This action is intended to limit the radiation exposure of individuals, provide adequate time for assessing the severity of the accident and, if necessary, to assemble teams and equipment for initiating emergency responses outside the PAZ in accordance with the Port Safety Plan. There would normally be no restriction upon authorised persons entering the Precautionary Action Zone (PAZ), provided their presence and whereabouts were known to the authorities and they were subject to immediate control. Residence of members of the general public would normally be excluded from the PAZ but residence of official personnel, such as night watchmen, might be acceptable on condition that they could be evacuated from the area immediately if an emergency were to arise.

3.16 The Urgent Protective Action Zone (UPZ) is the area where preparations are made to promptly perform environmental monitoring and implement urgent protective actions based on the results. The extent of the UPZ is derived from the Reference NPW Accident model, for the applicable removal time. The emergency arrangements must ensure that it is possible to undertake protective measures in an effective manner within a short time scale, in order to ensure that radiation doses to the public are minimised and optimised.

3.17 The Long Term Protective Action Zone (LPZ) represents an area within which the radiation exposure would be due to direct exposure to the deposited plume contamination or from ingestion of contaminated water, foodstuffs, milk and agricultural produce from within the LPZ. For the purposes of longer term protective measures, the LPZ is taken to include the PAZ and UPZ.

3.18 In practice the areas in which protective measures would be implemented outside the PAZ would vary according to the severity of the accident and prevailing meteorological conditions and would be determined by measurements of radiation and contamination levels.

Time to remove vessel

3.19 An effective measure to reduce the radiation exposure to the public and emergency personnel from the radioactive plume downwind of the release is the rapid removal of the vessel, in accordance with Condition (e) in the Conditions of Entry (paragraph 3.3). The time available to achieve this is dependent upon the population distribution around the particular berth since this determines the extent of the Urgent Protective Action Zone (UPZ) boundary. Characteristics of the berth and surrounding waterways must facilitate rapid removal of the vessel.

3.20 In discussions with US naval representatives, the Department of Defence has confirmed that US NPW having more than one reactor can rely on either reactor for manoeuvring the ships regardless of the condition of the other reactor plant, and that these vessels are maintained in a high state of readiness to go to sea. The Department of Defence has determined that there would be no requirement to provide tugs to assist in the removal of multi-reactor vessels with a damaged reactor, at anchor. However, there would be a requirement to provide tugs to assist in the removal of multi-reactor vessel berthed at an alongside berth and for all single reactor vessels with a damaged reactor.

Approved primary and secondary berths and anchorages

3.21 The primary berths and anchorages (including remote anchorages) which have been assessed as suitable, subject to adequate arrangements being made for the visit of each particular unit, are shown in Annex A. A detailed list is included in Annexes B–G of this chapter. The only Berths cleared for use by NIMITZ Class NPW are Fisherman Island Berths 1-9, Grain Wharf and Coal Wharf, Brisbane, Queensland (Annex D), Gage Roads North, Fremantle, Western Australia (Annex B), Ralph's Bay, Hobart, Tasmania (Annex C), East Arm and Darwin Harbour, Darwin, Northern Territory (Annex E), and Port Phillip Bay (Annex G), Melbourne, Victoria.

PORT VALIDATION

Procedure

3.22 A port validation is a process of review and assessment. The aim of the validation is to ensure that the State/Territory NPW visit arrangements meet the requirements of OPSMAN 1. A validation includes:

- a. Compliance evaluation of port safety plans and arrangements by the VSP(N) TWG against OPSMAN1;
- b. Completion of the Port Safety Plan check list by the jurisdiction for evaluation by VSP(N) TWG;
- c. Meeting with the local NPW committee and conduct of a non-deployment exercise;
- d. Preparation and tabling of the revalidation report to the VSP(N); and
- e. Confirmation of testing of port safety plans (drills and exercises).

Validation of berths and anchorages

3.23 When a berth or anchorage has not been used for a period of 12 months it shall be validated by the VSP(N) TWG prior to its use by a NPW. Berths and anchorages should also be validated, despite the number of NPW visits on a routine basis as determined by the VSP(N). Validations should, where possible, be timed to coincide with pre-visit exercises. Validation will take into account changing factors such as land use and population. The validation procedure is to be rigorous with the emphasis on the validation of the relevant state/territory response plan to ensure it adequately addresses the requirements in OPSMAN 1.

3.24 Each year VSP(N) TWG will develop a rolling plan that will enable all NPW ports to be validated every two years for primary ports tier 1 and as determined by the VSP(N) TWG for other ports. The VSP(N) TWG is also responsible for advising the ports and state/territory emergency services of the proposed visit schedule. When compiling the plan it is imperative that the relevant state/territory personnel are available. As a minimum the following personnel should be available for the duration of the validation visit; State Radiation Health Officer, Emergency Services Director (or nominated representative), functional area responsible for the Emergency Plan and other state/territory officials with knowledge of NPW visits.

3.25 The validation check list (Annex I) provides guidance on the areas within the state/territory plan that are to be addressed. This checklist is normally circulated six weeks before the visit to the port(s) to be validated. The validation is to be a robust process that checks all parts of the emergency plans and in particular to pay attention to those areas within the Port that have changed since the previous validation to ensure the port safety plan meets the requirements and directives laid down by the Australian Government. These procedures are considered essential to safeguard the safety of Australian citizens.

Annexes:

- A. Availability of berths for classes of Nuclear-Powered Warships
- B. Conditions of entry and validation requirements
- C. Nuclear Powered Warship Port Assessment and Validation check list

AVAILABILITY OF BERTHS FOR CLASSES OF NUCLEAR-POWERED WARSHIPS

SHIP CLASS	FREMANTLE			HMAS STIRLING			ALBANY	MELBOURNE	HOBART	JERVIS BAY	BRISBANE	GLADSTONE	DARWIN		
	North	South	Outer	Berth	Anchor	Buoys	Anchor	Anchor	Anchor	Anchor	Berth	Berth	Berth	Anchor	Buoy
NIMITZ	Y4/5	N	N	N	N	N	N	Y	Y4/5	N	Y	N	Y7	Y4/5	N
SUBMARINE	Y2/4	Y2/4	Y2/4	Y	Y4	Y	Y2/4	Y2/4	Y2/4	Y4	Y3	Y3	Y3	Y2/4	Y
PORT CLASSIFICATION	P	P	P	P	P	P	S	P	P	S	P	S	P	P	P
VALIDATION TIER	ONE			ONE			THREE	TWO	TWO	THREE	ONE	TWO	ONE		

Notes:

All port visits are to comply with long standing Conditions of Entry described in OPSMAN 1

1. Subject to navigational constraints (Limited draught)
2. Exposed anchorages not suitable for this class of vessel under certain weather conditions
3. Unsuitable for submarines without additional fendering
4. NPW are to anchor within one cable (200 yds) of the positions stated in Annexes B–G except for the NIMITZ Anchorage at Hobart where a survey buoy will be laid
5. Survey buoy marks anchorage
6. P = primary / S = secondary, All primary ports can also be secondary ports.
7. The berth may only be used during neap tide cycles where the minimum under keel clearance of 2.0 metres can be maintained.

CONDITIONS OF ENTRY AND VALIDATION REQUIREMENTS

1. The following table summarises Condition of Entry requirements for Primary and Secondary NPW ports and the routine requirements for the conduct of the re-validation.

Conditions of Entry	PRIMARY PORT TIER ONE	PRIMARY PORT TIERTWO	SECONDARY PORT
Six week visit notification period	Yes	Yes	Not required.
Radiation monitoring with ANSTO LRMG	Yes	Yes	Not Required
Environmental sampling	Yes	Yes	Post visit only
Liability and Indemnity	Yes	Yes	Yes
Movement of vessels during daylight only	Yes	Yes	Yes See Note 1
Navigational controls on shipping	Yes	Yes	Yes
Standby tugs available during the visit	Yes	Yes	Not Required
Operating Port Safety Plan	Yes	Yes	Placed on standby

Port validation requirements

Port Safety Plan. See Note 2	Yes	Yes	Yes
Validation team visit biennially	Yes	No	No
Validation team to review PSP and conduct an exercise before visit	Not Required	Yes	No
Monitoring Group exercise before a visit	Yes	Yes	Not required
Biennial desktop review of Port Safety Plan	Not Required	Yes	Yes

Notes:

1. Unless conducting medical emergency transfer
2. PSP — Port Safety Plan
3. eExercise — An exercise that does not require field deployment of the Radiation Monitoring Group

Table 3H1:—Conditions of entry and validation requirements

PART A—NUCLEAR POWERED WARSHIP PORT SAFETY PLAN CHECK LIST

1. This check list is to be used when validating port safety plans for visits by Nuclear Powered Warships. When using the check list care should be taken to account for variation in State/Territory emergency management arrangements and the geographical conditions of the site.

- [illegible]

Serial	Plan Contents	Yes / No	Remarks
1	Introduction		
a	Does the plan have: <ul style="list-style-type: none"> Title Date of Issue Appropriate Distribution Amendment List Table of Contents Glossary Date Last Reviewed (indicate date) 		
b	Does the plan provide a background section on the nature of the hazard?		
c	Does the plan provide locations of key population centres and farming within 5km of the berth/anchorage such as schools, age care facilities, hospitals, dairy and egg production facilities?		
d	Does the plan provide details of the authority/legislation for the plan?		
e	Does the plan refer to associated plans and sub-plans?		
f	Does the plan make reference to the requirement for the issue of a Visit Operation Order?		
2	Berth / Anchorage Facilities		
a	Does the plan define the locations of the berths and/or anchorages (safe/remote)?		
b	Does the plan include clear charts/maps showing the berths/anchorages and surrounding areas?		
c	Does the plan provide details of berths regarding lengths, depth of water, sullage and other wharf services?		
3	Organisation		
a	Does the plan identify the State and Local authorities involved in the Port Safety Plan, including: <ul style="list-style-type: none"> Organisational Structure (line diagram/organisational chart) State Visits Committee Organisations (role and responsibilities) Key personnel appointments and responsibilities (usually shown in Annex) including: <ul style="list-style-type: none"> Incident Controller/Manager Radiation Protection Officer Duty Officer Zone 1 Leader Radiation Monitoring Team 		

Serial	Plan Contents	Yes / No	Remarks
	<ul style="list-style-type: none"> Radiation Monitoring Personnel 		
b	Does the plan identify supporting organisations and locations e.g. NNSO?		
4	Plan Procedures		
a	Does the plan include a concept of operations, including: <ul style="list-style-type: none"> Designation of EPZs Procedures for evacuation or shelter in place 		
b	Does the plan have a series of phases and the actions to be carried out in each phase/stage? <ul style="list-style-type: none"> Actions on sounding of Alarm in the PAZ. 		
c	Ship removal procedures including: <ul style="list-style-type: none"> Towing arrangements Shore party arrangements Protective equipment 		
d	Evacuation plan, including: <ul style="list-style-type: none"> Decision criteria to evacuate Evacuation/Shelter in Place population in UPZ Special requirements – aged care facilities, schools, hospitals Transportation Evacuation shelters/facilities Routes and traffic control Advising the public 		
e	Medical. Does the plan include: <ul style="list-style-type: none"> Procedures for the decontamination of contaminated personnel Arrangements for the transport of contaminated personnel Arrangements for the treatment of radiological casualties at pre-designated hospitals 		
5	Command, Control and Co-ordination Arrangements		
a	Does the plan include command, control and co-ordination arrangements, including: <ul style="list-style-type: none"> Location of an EOC and alternate Staffing of the EOC SOPs for the EOC, including <ul style="list-style-type: none"> ✓ Standardised maps/charts and plotting procedures ✓ Callout/alerting procedures 		

Serial	Plan Contents	Yes / No	Remarks
	Liaison Officers Information processing/Logs/Status Boards Briefings Hazard modelling Shifts to allow 24 hour operations EOC equipment – telephones/faxes/computers		
b	Communication plan, including: <ul style="list-style-type: none"> • Communications with the NPW • Communications with PAZ Duty Officer • Communications with Radiation Monitoring Team • Communications with decontamination facilities • Communications with other supporting agencies 		
c	Procedures for obtaining meteorological information		
d	Contact details (Annex) – Local, State & Federal		
e	Liaison channels with other departments		
f	Media arrangements and announcements, including <ul style="list-style-type: none"> • Nominated spokesperson and method of dissemination • Initial public announcement • Advice on evacuation • Advice on shelter in place 		
6	Radiation Monitoring		
a	Does the plan include: <ul style="list-style-type: none"> • Organisation and equipment of radiation monitoring teams • Call out procedures • Monitoring procedures in accordance with the Radiation Monitoring Handbook • Reporting procedures (MONREPS) 		
b	Monitoring at decontamination facilities		
c	Radiological dose control		
d	Long term health measures, including: <ul style="list-style-type: none"> • Determination extent of radiological hazard in PAZ, UPZ and LPZ • Protection of the public from ingestion of contaminated food 		

Serial	Plan Contents	Yes / No	Remarks
	<ul style="list-style-type: none"> Monitoring and mapping of hazard areas 		
	<ul style="list-style-type: none"> Procedures for declaring an area safe 		
7	Visit Operation Order		
a	Does the VOO provide a summary of the vessels characteristics and include: <ul style="list-style-type: none"> Visit timetable Location of monitoring teams / posts Emergency communications nets Frequencies Contact procedures with the NPW Personnel rosters Telephone numbers 		
8	Maintenance of Plans		
a	Does the plan indicate a review process including: <ul style="list-style-type: none"> When it is to be reviewed By whom it is to be reviewed – planning committee Where changes are to be forwarded 		
9	Training and Exercises		
a	Does the plan include: <ul style="list-style-type: none"> What training is required by key appointments Where is the training obtained What exercises are to be conducted When exercises are to be conducted 		

Plan Review Summary

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Plan Manager Comments

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Evaluator

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Date

PART B—CHECKLIST FOR ASSESSMENT AND VALIDATION OF PORT BERTHS AND/OR ANCHORAGES FOR VISITS BY NUCLEAR POWERED WARSHIPS

Date:

1. City:

2. Number of Approved Berths & Anchorages

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3. Number and Location of Remote Anchorages

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4. Port Description & Significant Changes since last Validation

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5. Features of Services for Individual Berths, Anchorages & Moorings, including fire fighting facilities, access to water and electricity, fendering arrangements, crane services

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6. Features of Remote Anchorages

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7. Industry Developments in the Vicinity of Berths, Anchorages & Moorings

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8. Potential Hazards to NPW from Industrial Installations (hazardous cargo handling berths, use of adjacent berths).

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9. Potential Hazards to Industrial Installations from an NPW Accident

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10. Public Infrastructure Development within 5km (schools – number of pupils, hospitals – number of beds, major public buildings, airfields, milk & egg production facilities).

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11. Significant Navigation Features (including hazards, berthing difficulties, tidal and current information, proximity to other shipping).

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12. Features of Area within Zone 1 (population, boundaries of Zone 1 – shoreline, fences, gates, provision of physical control, method of warning).

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13. Features of Area within Zone 2 (population density and distribution, ease of evacuation and control, food crops production and distribution, use of waterways).

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14. Provision for Remote Radiation Monitoring in Zone 1.

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15. Provision for Decontamination of Evacuees from PAZ.

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16. Site specific Meteorological Information (including prevailing wind direction day and night, incidence of inversion conditions, average rainfall).

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17. Location of Emergency Operations Centres.

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18. Systems, radio networks, road network).

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19. State of Readiness of the Port Safety Plan.

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20. Date of Last Emergency Exercise.

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21. Availability of RAN Assistance.

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22. Security Arrangements for NPW Visit.

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CHAPTER 4

PORT SAFETY ARRANGEMENTS

General

4.1 The Conditions of Entry for nuclear-powered warships (NPW) require that, for the port being visited, there will be an operating safety organisation, competent to conduct a suitable radiation monitoring program and able to initiate actions and provide services necessary to safeguard the public in the event of a release of radioactivity following a reactor accident. The organisation is to be well practised and capable of quick and effective action.

Responsibility

4.2 As the authority for controlling the required resources is vested in the State/Territory Government and its instrumentalities, the State/Territory Government is responsible for drawing up contingency plans and controlling the safety organisation for those ports under its control.

4.3 The Australian Government will provide technical expertise, trained manpower and specialised equipment to assist in establishing the organisation and conducting operations during NPW visits. The Royal Australian Navy (RAN) will implement safety plans for those ports under its control while taking due cognisance of State/Territory requirements.

Plans

4.4 Each port likely to be visited will require a Port Safety Plan (PSP) specifically for NPW visits, as well as a Visit Operations Order (VOO) for each specific visit. Guidelines for the preparation and maintenance of these plans and instructions are contained in this document. Port Safety Plans are issued separately by State/Territory Governments or the RAN.

Radiation monitoring

4.5 The guidelines herein detail the suitable radiation-monitoring program to address two situations:

- a. routine radiation monitoring before, during and post visit, and
- b. emergency radiation monitoring related to a reactor accident.

ROUTINE RADIATION MONITORING

Objectives

4.6 The objectives of routine radiation monitoring for NPW visits are to:

- a. Provide a means to confirm that there are no increases in external radiation levels during an NPW visit,
- b. Address pathways for internal radiation exposure through environmental monitoring to confirm there are no releases of solid or liquid radioactive waste to the environment.

4.7 The arrangements and procedures for the monitoring for both external and internal radiation exposures are in Annex B to this chapter.

External radiation exposure

4.8 The potential for the external radiation exposure of personnel in the vicinity of a NPW at an alongside berth is checked at regular intervals by radiation surveys of areas designated as free for public access.

4.9 A radiation monitoring system is to be available during each NPW visit to provide early detection of a reactor accident of sufficient severity to possibly cause a major release of fission products to the environment. This early warning system is complemented by arrangements for notification by the NPW should an accident occur. This requires that Commanding Officers (CO) of NPW, or their delegated representatives, will advise a nominated official of the Port Safety Organisation immediately a release of radioactivity or a reactor accident occurs.

The NPW is to be kept under surveillance for direct emission of gamma radiation that could provide indication of such an accident. The detection of gamma radiation significantly above background levels enables the prompt initiation of protective countermeasures.

Internal radiation exposure

4.10 The potential for exposure to people and the environment from releases of radioactive material is checked by a program of environmental monitoring. Analyses for radionuclides known to characterise radioactive discharges likely to arise from a NPW is conducted by the collection and analysis of environmental samples as determined by ARPANSA.

Radiation protection standards

4.11 The Australian radiation protection standards, which are relevant to radiation exposure of radiation worker and members of the public during a routine NPW visit, are the recommendations of Australian Radiation Protection and Nuclear Safety Agency (ARPANSA), *Recommendations for limiting exposure to ionising radiation (1995)* and National Occupation Health and Safety Commission (NOHSC), *National Standard for limiting exposure to ionising radiation (2002)*, Radiation Protection Series 1, (ARPANSA) (2002) (RPS 1).

EMERGENCY RADIATION MONITORING

Objectives

4.12 The objectives for emergency radiation monitoring in the event of an NPW accident are to:

- a. determine the nature and extent of any release,
- b. assess levels of radiation and radioactive contamination in the environment around the ship,
- c. assess the magnitude and nature of the hazard arising from an accident,
- d. determine when a release has terminated,
- e. assess the need and extent of required protective measures. and
- f. determine the requirements for recovery of affected areas and return to normal.

Immediate post-accident monitoring

4.13 Radiation monitoring surveys are initiated immediately on confirmation of detection of a high gamma radiation level or on notification by the vessel that a reactor accident has occurred.

Longer term monitoring

4.14 More extensive monitoring of affected areas is conducted following the immediate post-accident monitoring. This could continue for several days, weeks or months, depending on the extent of the release. Additional personnel and equipment, including laboratory facilities, are likely to be required and are planned for.

4.15 The arrangements and procedures for radiation monitoring following an accident are in Annex B to this chapter.

Radiation protection standards

4.16 The emergency reference levels to be used as the basis for the implementation of protective measures following a reactor accident are those recommended by the ARPANSA in *Intervention in Emergency Situations Involving Radiation Exposure (RPS 7)*.

NAVAL NUCLEAR SHIPS SAFETY ORGANISATION

Responsibility

4.18 At the port visited by a NPW, the CO of the local naval establishment or the local Defence Representative (where no naval establishment is located in the area) will be responsible for implementing an organisation known as the Naval Nuclear Ships Safety Organisation (NNSO).

Role

4.19 The role of the NNSO is to effectively coordinate those functions relevant to NPW safety arrangements that are allocated to the RAN.

Functions

4.20 The scope of these functions will vary depending on the port visited (whether under RAN control), or by its location, but will include:

- a. coordinating the issue of secure communications equipment to enable 24 hours communications capability between the NPW and the State/Territory Port Safety Organisation headquarters;
- b. provision of suitable assistance for radiation-monitoring operations (see Annex E to this chapter);
- c. at a naval berth, provision of the Officer in Charge of Precautionary Action Zone (PAZ);
- d. provision of craft, equipment and personnel for emergency towing;
- e. alerting the Port Safety Organisation and relevant Defence authorities upon receiving notice of a reactor accident: and
- f. in the event of an emergency, providing assistance to the State/Territory and local authorities.

TOWING ARRANGEMENTS

Requirement

4.21 The Conditions of Entry for NPW to Australian ports require that there must be a capability to remove the NPW, either under its own power or under tow, to a designated safe anchorage or a designated distance to sea, as soon as possible within the time frame specified for the particular berth or anchorage, and in any case within 24 hours, if a reactor accident should occur. The guidelines herein are designed to minimise the radiation hazard to personnel engaged in the removal of an NPW subject to such an accident. One standby tug is required for all submarine visits and two large harbour tugs are required to support CVN visits when berthed alongside. Currently the only approved alongside CVN berths are in Brisbane and Darwin.

Personnel

4.22 The personnel to whom these guidelines are to apply are the RAN crews of vessels assigned the towing duty, and shore parties required to slip an alongside vessel. Safety of other personnel is to be addressed in the Port Safety Plans.

Responsibilities

4.23 The RAN has the responsibility for making arrangements for provision of RAN crewed tugs capable of removing single reactor NPWs and multi reactor NPW berthed alongside in the event of a reactor accident. These tugs will also be required to assist NPWs upon arrival and departure in the event of commercial tug services being withdrawn, should the Minister for Defence approve such action. RAN tugs are to remain at one hour's notice during the entire period of the visit. The RAN, with Australian Nuclear Science and Technology Organisation's (ANSTO) assistance, has the responsibility for developing and maintaining specific training and procedures for personnel engaged in NPW towing operations. The RAN will also provide appropriate equipment for the RAN tug crews from the Department of Defence inventory.

Removal decision

4.24 Under certain circumstances it may be advisable for the NPW to remain at the berth or anchorage following a reactor accident. The decision on whether or not to request removal of the vessel would be made after consideration of the relative risks posed to members of the public and to personnel engaged in the removal operation. Advice from the CO of the NPW would also be sought regarding the state of the reactor plant and the potential severity of the accident. The decision to remove the NPW rests with the State/Territory Government after consultation with the NPW CO. Guidance for decision-makers on the removal of an NPW following an accident is contained in appendix 1 to Annex D, to this chapter.

Protective measures

4.25 In the event of a reactor accident, protection is required against four potential sources of hazard. These are:

- a. direct radiation (gamma shine) from the vessel;
- b. direct radiation from an airborne release of radioactive material;
- c. inhalation and/or ingestion of airborne radioactive material; and
- d. radiation from surface deposition of radioactive material.

All available protective methods are to be employed, including local means of radiation detection, protective clothing, potassium iodide prophylaxis tablets, decontamination and ship-handling procedures and using distance and time factors to minimise exposure.

Assumptions

4.26 In the development of these guidelines, it has been assumed that should it be necessary to move a submarine from an alongside berth, limited assistance may be available from the submarine's crew and that shore parties and the crews of the towing vessels are to be provided by the RAN. For removal of a submarine from an anchorage, it is assumed that the submarine crew will weigh anchor or slip the anchor cable from onboard.

Permissible radiation dose

4.27 In the event of a reactor accident radiation doses less than 50 millisievert (mSv) are applicable for these towing operations. However, in exceptional circumstances such as actions to save lives or the prevention of a catastrophic situation higher doses may be approved subject to strict conditions (refer to table 10 of ARPANSA publication RPS 7). Every care should be taken to ensure that these emergency doses to individuals are below the threshold for acute radiation effects of 1 Sv. Doses received in emergency or accidental exposures should be monitored and recorded

Radiation monitoring

4.28 Towing vessels are to be provided with the capability for measuring radiation levels during the approach to the NPW. Portable shore-side monitoring is to be provided to assess the risk to shore parties engaged in slipping berthing lines and/or attaching towing hawsers.

Towing vessel crew protection

4.29 Specific safety measures to be adopted by towing vessel crews are detailed in Annex F to this chapter. The importance of the specific protective measures listed could vary according to on-the-spot circumstances. However, in the absence of actual radiation protection measurements, these protective measures should be observed.

Shore party protection

4.30 The hazard from direct radiation from the vessel, particularly close to the reactor compartment, could be extreme and the actual radiation levels are to be measured before any approach to the vessel is undertaken. Radiation protection personnel should be available to undertake radiation measurements and to advise on permissible exposure times. Unless specific instructions to the contrary are given, the protective measures detailed in Annex G to this chapter are to be observed.

Towing vessel requirements

4.31 The towing vessels employed should have sufficient capability to tow to sea, or to, a remote anchorage, nuclear-powered warships of the types usually visiting Australia, taking into account local environmental conditions, in sea conditions up to sea-state 3.

4.32 When placed on stand-by for emergency NPW towing duties, the towing vessels are to be equipped with protective clothing, personal dosimeter equipment and stable iodine tablets for each member of the crew, and must carry radiation-monitoring instruments. A simple system for wash down of the decks and superstructure is also required.

PORT SAFETY ORGANISATION

General

4.33 To effect the requirement for provision of the safety organisation, State/Territory Governments need to establish committees for liaison between relevant Government departments, develop contingency plans, provide means for the control of the response organisations, and enact the necessary supporting legislation.

State/Territory Visits Committee

4.34 Each State/Territory should establish a NPW Visits Committee (NPWVC) charged with the responsibility for creating, administering and implementing the State/Territory safety organisation. The NPWVC should consist of senior representatives from local government and instrumentalities likely to be involved in a NPW visit, particularly in the event of an emergency situation. For example, representatives from the Police, Emergency Services, Port Authority, and Health/Environment are to be included.

Nuclear-Powered Warship Visits Committee (NPWVC) functions

4.35 The functions of the NPWVC are to:

- a. oversee the preparation, approval and maintenance of Port Safety Plans for NPW visits;
- b. coordinate the activities of departments and instrumentalities involved in the preparation for, and conduct of, NPW visits;
- c. establish the specialised units required to carry out the various operations associated with a NPW visit;
- d. activate the routine and emergency measures as called for in the contingency plans;
- e. inform and advise higher authority on NPW visit matters; and
- f. liaise with Australian Government departments as required.

4.36 In setting up the safety organisation, it is an important requirement for the NPWVC to ensure that the senior officials in the organisation are vested with the necessary authority for them to carry out their duties.

Control of operations

4.37 Depending on the scope of the required organisation, the State/Territory may appoint an executive body to coordinate and control operations immediately prior to, during and immediately after a NPW visit. This is normally affected using the resources of the State/Territory Emergency Services.

Naval Nuclear Ships Safety Organisation (NNSO)

4.38 In accordance with Defence and State/Territory contingency plans, the CO of the local naval establishment/Defence Representative in the port will establish and activate the NNSO.

Attorney-General's Department, Emergency Management Australia (AGD EMA)

4.39 In the event of a reactor accident, the effected State/Territory may request Australian Government Assistance. All requests are coordinated by EMA AGD, who will:

- a. liaise with the relevant Australian Government Departments on the accident; and
- b. coordinate the provision of Australian Government physical assistance when requested by the effected State/Territory.

Australian Government liaison

4.40 Administrative liaison is normally effected through the VSP(N) for those matters of an interdepartmental nature, or through normal inter-governmental channels if of a specialised nature. However, for operational matters during a visit, provision of additional Australian Government support to the local area is effected through AGD EMA.

PLANS

General

4.41 The contingency plans that are developed by, and are the responsibility of State/Territory Governments, are designed to address all aspects of the routine and emergency matters associated with the preparation for, conduct of and subsequent follow-up action required for NPW visits.

Content

4.42 The plans must address those measures designed to ensure the maintenance of public safety in the event of a reactor accident. Specifically the organisation detailed in the Plan should address routine and emergency operations management, removal times, radiation monitoring, security, supporting personnel and services, links to other Emergency Plans and public information.

Visit Operations Order

4.43 In addition to the general Port Safety Plan, a Visits Operation Order (VOO) should be issued for each individual NPW visit containing details specific to that visit.

Port Safety Plan guide

4.44 Because of differing State/Territory legislation, a standard format for such plans is not feasible. However, as a guide to the preparation and maintenance of Port Safety Plans and Visit Operation Order, an example of the issues that should be addressed is in Annex I.

Exercise

4.45 State and Territory authorities are to exercise their Port Safety Organisation before the visit of a NPW. However, no exercise is required if an exercise has been held at the port during the previous 12 months and there has been no change in key personnel since that exercise. Every two years an exercise should be conducted that includes the deployment of agencies involved in NPW accident response. Where possible these exercises should coincide with the port revalidation.

Emergency action

4.46 The broad, initial responses that the specified organisations are required to complete on indication of a reactor accident are outlined in Annex D to this chapter. Follow-up action will depend on the extent of the accident but should devolve upon those organisations described therein.

Maintenance of plans

4.47 All NPW Port Safety Plans are to be kept under regular review in order to maintain their currency. The Attorney-General's Department (AGD) and National Port Services hold copies of all State/Territory plans, which are to be kept current by attaching all amendments thereto. Should these amendments have national application or be considered to be in the interests of better planning for all affected Australian organisations, they should be submitted to AGD, for consideration by the VSP(N).

Annexes:

- A. Background information
- B. Port radiation monitoring—arrangements and procedures
- C. Emergency planning zones
- D. Action in the event of a reactor accident
- E. Royal Australian Navy assistance to the Radiation Monitoring Group
- F. Protective measures—towing vessel crews
- G. Protective measures—shore parties
- H. Towing vessel equipment
- I. Port Safety Plan guide
- J. Australian Nuclear Science and Technology Organisation emergency support equipment
- K. Interaction with the public and media

BACKGROUND INFORMATION

NUCLEAR PROPULSION PLANT

1. Nuclear-powered warships (NPW) use conventional steam turbine machinery in the propulsion system with the energy for steam generation being supplied from the fission of uranium fuel in a nuclear reactor rather than from the combustion of conventional fossil fuels such as oil. NPW of the United States Navy (USN) and of the Royal Navy (RN) use pressurised water reactors, which employ indirect steam generation involving a primary and a secondary circuit. The nuclear reactor vessel, which is part of the primary circuit, contains a core of uranium fuel elements within which heat is generated by the fission process. Interspaced with the fuel elements are control rods which provide means of regulating the fission process and hence the heat generation rate. To achieve criticality, selected control rods are slowly withdrawn from the core until the process of nuclear fission becomes self-sustaining.
2. Primary cooling water is circulated through the core, removing heat from the fuel elements and transporting it, via a heat exchanger, to the secondary circuit where the steam generated drives the propulsion turbine and auxiliary machinery. This indirect system is designed to confine radioactive material to the primary circuit. The entire primary circuit, including the reactor vessel, is contained within a compartment designed to confine radioactive material, which might escape from the primary circuit. Radiation shielding is provided to reduce radiation levels.
3. As well as producing heat, the fission process generates fission products within the fuel, some of which are highly radioactive and potentially hazardous to health. There is no hazard, provided that the fission products remain contained within the fuel element assemblies. At the end of their useful life the spent fuel elements containing these fission products are discharged ashore at special handling facilities at the warships' homeports.
4. Extensive precautions are taken in the design, construction and operation of all nuclear reactors, including marine propulsion units, to protect against the release of radioactive material to the environment. The excellent nuclear safety record of the United States (US) and United Kingdom (UK) NPW exemplifies the effectiveness of these precautions.
5. Australian authorities monitor radiation levels during visits to Australian ports by NPW and environmental samples are analysed after visits. Assessment of results is published in the Department of Defence Annual Report on Radiation Monitoring on Visits by Nuclear Powered Warships to Australian Ports. The report is available on the ARPANSA Website (<http://www.arpansa.gov.au/>).
6. The radiation and environmental monitoring program has confirmed releases of radioactive material have not been detected, nor have any radiation measurements been recorded in excess of background levels of ionising radiation, either during or subsequent to any visit. This confirms that the procedures and checks used by the USN in managing its radioactive wastes are effective and that the potential for exposure of members of the Australian public and the environment arising from the discharge of radioactive wastes from a visiting NPW is very low.

PORT RADIATION MONITORING—ARRANGEMENTS AND PROCEDURES

General

1. This Annex presents a set of basic arrangements and procedures for a program capable of meeting the radiation monitoring requirements at Australian ports visited by nuclear-powered warships (NPW).
2. The arrangements and procedures provide for the allocation of certain key responsibilities in a suitable monitoring program. They also provide an outline of procedures whereby Australian Government radiation protection officers engaged in routine monitoring at a port are able to activate the Port Safety Organisation in the event of enhanced radiation monitoring readings or notification of a release of radioactive material.
3. The techniques, practices and procedures of radiation monitoring for NPW visits, the use of measured radiation levels as operational intervention levels for protective measures, and working guidelines relating to the emergency reference levels recommended for Australia are set out in the following documents;
 - a. Recommendations for Interventions in Emergency Situation Involving Radiation Exposure (ARPANSA Radiation Protection Series RPS7, 2004);
 - b. Australian Nuclear Science and Technology Organisation (ANSTO) Radiation Monitoring Handbook for Visits by Nuclear-powered Warships to Australian Ports and
 - c. Environmental Monitoring Handbook for Visits by Nuclear-powered Warships (ARPANSA Technical Report TR145, 2006)

Note:

1. These documents are available as a reference document to all Australian Government and State radiation protection officers participating in radiation monitoring of NPW visits.
4. The capability to conduct radiation monitoring is to be established in a port before a NPW visit commences. To this end, a Radiation Monitoring Group (RMG) is to be formed for each NPW visit and made responsible for both routine and emergency radiation monitoring. The RMG will be staffed by either two Australian Government officers, State radiation protection officers or a combination of both. The Australian Government, through ANSTO, will ensure that an appropriately qualified officer is available for each NPW visit to act as the Leader of the RMG.

Pre-visit preparation and stand-by arrangement

5. Arrangements are to be made for the radiation monitoring equipment (required for routine monitoring and for emergency monitoring) to be available at ports immediately before and during NPW visits. It is to be held in the custody of the RMG. Supporting operations and communications facilities are State/Territory responsibilities.
6. Before each NPW visit, the RMG is to be brought to operational readiness. The Leader RMG (LRMG) is responsible to the State/Territory Radiation Officer (SRO/TRO) for control of:
 - a. the pre-visit exercising/briefing of the RMG;
 - b. the readiness and functional status of all monitoring equipment; and
 - c. ensuring that communications equipment and transport arrangements are provided to the RMG in compliance with the Port Safety Plan.
7. The State/Territory members of the RMG may then revert to stand-by for the period of the visit or until called out. Australian Government members of the RMG are to remain on call throughout the visit and implement the routine radiation monitoring requirements as detailed in the *Radiation Monitoring Handbook*.

State/Territory Radiation Officer

8. A SRO/TRO is to be nominated by the host State/Territory and made responsible for advice to authorities of the host State/Territory on all public health aspects of radiation safety arising from NPW visits. The SRO/TRO is to be an experienced senior professional health physicist nominated by the host State/Territory.

9. In the event of a reactor accident, the SRO/TRO is to be specifically responsible for advising the Port Safety Organisation:

- a. on hazards to the health of members of the public,
- b. of the need to implement protective measures, and
- c. when normal activities may be resumed in affected areas.

Leader Radiation Monitoring Group

10. The LRMG, is an appropriately qualified and experienced Radiation Health Physicist responsible for advising the SRO/TRO on the:

- a. pattern of radiation monitoring conducted by the RMG,
- b. specific needs for ongoing radiation monitoring, and
- c. results of radiation monitoring as they may effect the public.

Australian Government Technical Adviser

11. Irrespective of the local measures taken, on confirmation of an accident the following Australian Government Officers will be deployed:

- a. ARPANSA will provide a suitably qualified senior radiation health expert as the Australian Government Technical Adviser, to liaise and offer technical advice to the State/Territory authorities in the affected area as appropriate.
- b. ARPANSA will coordinate with AGD EMA on deploying Liaison Officers to AGD EMA in Canberra to liaise on provision of technical advice to Australian Government.
- c. ARPANSA and ANSTO will coordinate with the State/Territory authorities on deploying Liaison Officers to the affected State or Territory operations centre to liaise on provision of technical advice.

ROUTINE ENVIRONMENTAL RADIATION MONITORING

External radiation exposure

12. The levels of gamma radiation during an NPW visit at an alongside berth is to be checked by radiation surveys on the vessel's arrival at the berth, and approximately once daily thereafter. The surveys are to be confined to those areas in the vicinity of the NPW designated as free for public access. Members of the RMG are to make the surveys in accordance with the instructions set out in the Radiation Monitoring Handbook and the results are assessed to determine any increase in established background radiation levels.

Passive dosimeters

13. To provide data on radiation doses which would result from an accidental release of airborne radioactivity, a number of passive dosimeters are to be placed at selected locations in the vicinity of an NPW berth during each NPW visit. The provision and analysis of the doses recorded by the passive dosimeters is the responsibility of ARPANSA. The number and location of dosimeters issued for individual berths are to be determined jointly by the Australian Government and State/Territory.

Support facilities for radiation monitoring

14. Arrangements are to be made to provide:
 - a. adequate radio communications facilities and equipment for radiation protection officers of the RMG,
 - b. vehicles for use as mobile monitoring units throughout NPW visits, and
 - c. secure storage facilities to accommodate equipment for the RMG.

Provision of Radiation Monitoring Equipment

15. The Australian Government provides all radiation monitoring equipment. Except for the equipment in Annex H, it is to be retained by ANSTO and properly maintained and calibrated. Equipment required for a NPW visit will be made available at the port, checked and made operational as part of the preparation and stand-by arrangements. Equipment is itemised in the Radiation Monitoring Handbook.

16. Additional backup equipment may be required in the event of an accident and is to be provided in accordance with Annex J.

Marine Environmental Sampling Program

17. The potential for internal radiation exposure of members of the public is to be kept under surveillance by a marine environmental sampling program. The program is a cooperative venture between the Australian Government and the host State/Territory and is to gather environmental samples as determined by ARPANSA from the vicinity of the berths.

18. Samples are to be collected by State/Territory authorities, or by the Royal Australian Navy where berths are at naval bases, and analysed by ARPANSA. All samples are to be forwarded to ARPANSA as soon as possible after the sample has been collected for analysis. ARPANSA will advise the relevant jurisdiction to any result indicating an increase in established background levels. Results of abnormal measurements are to be forwarded by the Australian Government to relevant State/Territory authorities immediately. All summaries of the results are to be published annually in the Annual Report on Radiation Monitoring on Visits by Nuclear Powered Warships to Australian Ports.

19. A reliable baseline of radioactivity in the marine environment will be established at all approved NPW ports. This will involve the collection of a number of samples at different times of year to ensure seasonal variations of radioactivity in the environment is taken into consideration. This baseline will be used to compare samples collected after a visit by a NPW to determine whether a release of radioactivity to the environment has occurred.

20. The baseline sampling program at an approved berth may be discontinued provided that:
 - a. the sampling program has been implemented for a sufficient period to account for seasonal variations; or
 - b. State/Territory and Australian Government authorities are agreed that a reliable baseline of radioactivity has been established.

21. Once a baseline sampling program has been discontinued at a port, less frequent sampling should be conducted to ensure the baseline data has not changed. Routine sampling taken for a scheduled NPW visit that does not indicate a release of radioactivity may be considered for inclusion into the baseline data.

RADIATION MONITORING IN RELATION TO A REACTOR ACCIDENT

Early warning system

22. A facility to provide early warning of a reactor accident is required and is to be based upon detection of gamma radiation emitted from the NPW as a consequence of the accident.

23. The early warning system is to:
- be capable of continuous operations,
 - employ the principles of redundancy and diversity to ensure reliability of operation and freedom from spurious signals,
 - normally have its detectors located with a clear line of sight to the NPW, and
 - provide an audible alarm upon detection of a sustained increase in gamma radiation levels.
24. Signals from the detectors are to be relayed to a data logging computer in parallel with a pre-set alarm facility which is continually manned throughout NPW visits.
25. Selection of a suitable site for the detectors in the early warning system and a location for the data logging computer should be made after consultation between State/Territory and Australian Government officers. The installation of the system is to be undertaken by the Australian Government with State/Territory assistance as required.
26. NPW at anchor will be monitored from a vessel stationed within the Precautionary Action Zone (PAZ) of the NPW. A watchkeeper will be provided to oversee the continuous monitoring equipment. Should weather conditions deteriorate to the situation whereby it is hazardous or difficult to maintain the designated position, then monitoring may cease; plume dispersal in such conditions would be such that radiation hazards would become negligible and hence monitoring unnecessary. However, in these circumstances the approval of the LRMG is to be sought before ceasing monitoring, and monitoring is to be recommenced immediately after the weather abates. Appropriate personnel are to be advised of cessation and recommencement of monitoring.

Operation of the early warning system

27. The data logging computer in the early warning system will provide an audible alarm signal on detection of high radiation levels. Guidance on the appropriate alarm level is set out in the *Radiation Monitoring Handbook*. Australian Government or State/Territory officers are to be in continuous attendance and are to respond to an alarm signal in accordance with predetermined procedures. Any alarm activation must be capable of being investigated within 20 minutes.
28. The procedures, which are to be implemented in the event of an alarm signal, are to be developed in detail for each port from the following general principles.

Procedures following an alarm

29. Personnel in Precautionary Action Zone (PAZ) should go to shelter stations until the LRMG authenticates the alarm. The LRMG and the Duty Officer of the Emergency Control Centre are to be notified immediately by the Officer-in-Charge (OIC) Precautionary Action Zone (PAZ) of an indication of a high radiation level and are to react as follows:
- the LRMG is to immediately investigate whether the indication is genuine. If so, they are to advise the OIC Precautionary Action Zone (PAZ) to implement evacuation of the zone and near simultaneously advise the Emergency Control Centre of the confirmed, alarm initiation of evacuation and the need to commence radiation surveys. If the alarm signal is not confirmed the non-confirmation should be recorded and, if due to an instrument fault, the fault remedied immediately.
 - the Duty Officer at the Emergency Control Centre is to immediately contact the NPW through established channels to seek confirmation of an accident. Upon confirmation of an alarm, either from the NPW or from the LRMG, the Duty Officer is to initiate the actions set out in the Port Safety Plan for the immediate evacuation of Precautionary Action Zone (PAZ) and the activation of the Port Safety Organisation.

Immediate post-accident radiation monitoring

30. Upon confirmation of an alarm, radiation surveys are to be initiated by the RMG. The first priorities are:

- a. gamma radiation measurements (to determine the magnitude and extent of any external radiation hazards due to direct radiation from the NPW),
- b. gamma radiation measurements and air sampling (to determine if a release of radioactive material has occurred), and
- c. air sampling (to determine airborne concentrations of critical radionuclides and to estimate inhalation hazards to members of the population).

31. Arrangements are also to be made by State/Territory authorities for the monitoring and if necessary, the decontamination of persons evacuated from Precautionary Action Zone (PAZ).

32. The LRMG in conjunction with the SRO/TRO is to direct radiation surveys as outlined above, initially in a direction downwind from the NPW. In conjunction with the SRO/TRO, they are to interpret the results and determine the need for further surveys.

Meteorological data

33. Visit arrangements are to include the availability of meteorological data, including local wind speed and direction throughout the visit to assist in estimating the extent and magnitude of the effects of a release of airborne radioactivity.

Longer term radiation monitoring

34. Following the immediate post-accident radiation-monitoring period more extensive environmental radiation monitoring is to be undertaken to:

- a. determine the extent of any decontamination needed,
- b. monitor foodstuffs that may have been affected,
- c. monitor the marine environment,
- d. provide assurances that evacuated areas can be reoccupied, and
- e. provide assurances that normal activities may be resumed in affected areas.

35. Substantial resources of staff and equipment may be needed for this purpose but the requirement is less urgent than that of immediate post-accident monitoring. Therefore, these resources can be obtained from other centres, including those remote from the port being visited. Organisations, which are expected to contribute this assistance, are to be informed beforehand.

COUNTERMEASURES TO PROTECT THE PUBLIC

36. Following a release of radioactive fission products to the atmosphere measures, which are available to counteract or minimise effects on the health of members of the public at risk include:

- a. sheltering indoors. Guidelines on sheltering are included in Appendix 1 to this Annex;
- b. evacuation of areas in the path that may be significantly affected by the radioactive plume;
- c. prophylaxis by administration of stable (inactive) iodine to those in the path of the radioactive plume; and
- d. restriction on the use of contaminated foodstuffs, especially milk and vegetables.

37. The implementation of protective measures may incur some additional risks to those affected, together with inconvenience and expense. The decision on appropriate protective measures should be made to ensure that any disadvantages accruing from a remedial measure are balanced against the benefits from reduction of the radiation risk. The implementation of protective measures in the UPZ should be based on the radiation monitoring results, compared with the recommended intervention and action levels in ARPANSA RPS7. To assist in the decision making, these levels are expressed as operational quantities (Operational Intervention Levels) such as dose rate and concentrations of marker radionuclides. The information in Annex C provides an indication of the distances from the berth for which the planning for protective measures may be necessary.

OPSMAN 1

38. The only countermeasure that provides effective prophylaxis against the effects of radio iodine's on the thyroid gland is oral stable iodine therapy. Guidance on stable iodine prophylaxis is provided in Annex A of the ARPANSA RPS 7. This guidance in RPS 7 advises that a history of allergy to iodine is a relative contraindication to the administration of stable iodine tablets. Consequently, personnel with known iodine allergy, or any of the conditions listed in the appendix to the publication, should not be used in the emergency response teams. Appendix 2 to this Annex is a proposed notice of distribution with stable iodine tablets.

EMERGENCY PLANNING ZONES

General

1. Emergency Planning Zones are designated around nuclear-powered warship (NPW) berths and anchorages for planning purposes to assist in the identification of areas where hazards might arise and to ensure that appropriate protective actions can be taken promptly and effectively in the event of an accident:

- a. **Precautionary Action Zone (PAZ)**—is an area close to the NPW within which protective measures will be implemented automatically upon notification of a reactor accident.
- b. **Urgent Protective Action Zone (UPZ)**—represents an area where preparations are made to promptly perform environmental monitoring and implement urgent protective actions based on the results. The UPZ includes Precautionary Action Zone (PAZ)
- c. **Long Term Protective Action Zone (LPZ)**—represents an area within which risks would be due to ingestion hazards from contamination of water, foodstuffs, milk and agricultural produce, and includes PAZ and UPZ.

2. The automatic implementation of protective measures within the Precautionary Action Zone (PAZ) is intended to limit radiation exposure of individuals, provide adequate time for assessing the severity of the accident and, if necessary, to assemble teams and equipment for initiating protective measures outside the Precautionary Action Zone (PAZ). In practice the areas in which further protective measures would be implemented would vary according to the severity of the accident and prevailing meteorological conditions and would be determined by measurements of radiation and contamination levels.

ZONE BOUNDARIES

Submarines

3. Based upon the Reference NPW Accident and the required vessel removal time of 24 hours, the calculated Emergency Planning Zone boundaries for all berths and anchorages in Australian ports when used by nuclear powered submarines:

- a. **Precautionary Action Zone (PAZ)**—a circle of 600 metres radius from the berth or anchorage.
- b. **Urgent Protective Action Zone (UPZ)**— a circle of 2.8 km radius from the berth or anchorage for 24 hour removal time or a circle of 2.3 km from the berth or anchorage for 4 hour removal time.
- c. **Long Term Protective Action Zone (LPZ)**—a circle of several kilometres radius from the berth or anchorage.

NIMITZ Class aircraft carriers

4. A number of anchorages and a berth have been assessed as being suitable for use by NIMITZ class aircraft carriers of the United States Navy. Based upon the Reference Accident, and a removal time of two hours, the Emergency Planning Zones for anchorages when used by these vessels are:

- a. **Precautionary Action Zone (PAZ)**—a circle of 800 metres radius from the anchorage or berth.
- b. **Urgent Protective Action Zone (UPZ)**—a circle of 3.7 km radius from the anchorage or berth.
- c. **Long Term Protective Action Zone (LPZ)**—an area extending several kilometres from the anchorage or berth.

5. The downwind distance specified for Precautionary Action Zone (PAZ) depends upon the characteristics of the particular anchorage and is sufficient to allow adequate response time to initiate protective measures outside the zone. The most restrictive radiological limit could be accumulated in the downwind direction at the Urgent Protective Action Zone (UPZ) boundary following a two hours release.

ACTION IN THE EVENT OF A REACTOR ACCIDENT

General

1. Action in the event of a reactor accident will require joint State and Australian Government action, as well as cooperation with the nuclear-powered warship's (NPW) national authorities. Immediate action in the local area will rest with the Port Safety Organisation, with follow-up support coordinated by the Australian Government.
2. The scope of emergency action will cover accident notification, protective countermeasures (for example; shelter, evacuation, radiation monitoring, decontamination, security) and public information, as well as the services required to control, support and maintain these actions.
3. The primary objective is to ensure the safety of the general public from the potential hazards of a reactor accident. It is likely that reaction to the accident will need exhaustive examination to establish possible medical consequences, the validity of some aspects of the reaction and compensation aspects. In addition, the accident itself and subsequent response will certainly attract considerable public and political attention. The overall organisation will therefore come under close scrutiny, both during and after the event. Hence, the direction, control and coordination of the response must be unified, timely and effective, as well as being fully documented.
4. This Annex sets out the broad, initial responses that the specified organisations are required to complete on indication of a reactor accident.

Notification

5. The occurrence of a reactor accident will be indicated by:
 - a. notification from the NPW, and/or
 - b. detection by the early warning radiation monitoring equipment.

Action

6. The immediate action to be undertaken by:
 - a. the Port Safety Organisation is to initiate emergency arrangements in accordance with the Point Safety Plan.
 - b. if a State/Territory has requested assistance from the Australian Government, EMA AGD will:
 - (1) liaise with Australian Government Departments; and
 - (2) coordinate Australian Government physical assistance (including international assistance).
 - c. Joint Operations Command is to:
 - (1) alert CJOPS;
 - (2) alert Air Headquarters to the probable requirement for the transport;
 - (3) direct the provision of Australian Defence Force (ADF) support; and
 - (4) liaise with EMA AGD on deploying ADF Liaison Officers within EMA AGD.

Nuclear-powered warship removal

7. Under certain circumstances it may be advisable for the NPW to remain at the berth or anchorage following a reactor accident. The decision on whether or not to request removal of the vessel would be made after consideration of the relative risks posed to members of the public and to personnel engaged in the removal operation. Advice from the Commanding Officer of the NPW would also be sought regarding the state of the reactor plant and the potential severity of the accident. The decision to request the removal of a NPW rests with the State/Territory Government. Guidance for decision-makers on removal of an NPW following an accident and actions at specific berths and anchorages are included in appendix 1 to this Annex.

Appendices:

1. Guidance for decision makers on the removal of a Nuclear-Powered Warship following an accident
2. Questions the duty officer or officer in charge (State Emergency Coordination Centre) should put to the Commanding Officer or Senior/Duty Officer Nuclear-Powered Warship in the event of a reactor accident

GUIDANCE FOR DECISION MAKERS ON THE REMOVAL OF A NUCLEAR- POWERED WARSHIP FOLLOWING AN ACCIDENT

PART 1—GENERAL

Purpose

1. An effective measure for protecting the population from exposure to radiation following a reactor accident on a nuclear-powered warship (NPW) in an Australian port could be to remove the vessel to a remote anchorage or to sea. These guidelines are to assist decision-makers in determining the circumstances under which vessel removal is an appropriate protective measure.

Background

2. The possible need to move an NPW from its berth following a reactor accident is considered during berth assessment, and berths are approved only if vessel removal is feasible without the risk of significant exposure to members of the public. Approval for individual visits is granted on the specific condition that, in the event of a reactor accident, the NPW will be removed on the direction of the competent Australian authority.

3. The Conditions of Entry for NPW to Australian ports require that there must be a capability to remove the NPW, either under its own power or under tow, to a designated safe anchorage or a designated distance to sea, as soon as possible within the time frame specified for the particular berth or anchorage, and in any case within 24 hours, if a reactor accident should occur.

4. All multi-reactor NPW have the capability to move under their own power following an accident and, in the case of nuclear-powered submarines or nuclear-powered aircraft carriers berthed alongside a wharf, Royal Australian Navy (RAN) tug(s) will be on stand-by to tow the vessel. Protective measures to be adopted by crews of towing vessels and by shore parties involved in vessel removal are provided in Annexes E and F respectively.

5. The specified time frame is normally 24 hours for all berths except for those used by NIMITZ Class aircraft carriers for which the time frame is two hours, and others where a reduced removal time is specified.

Objective

6. The aims of removing a vessel from its berth following an accident are to:
- minimise, to the extent practicable, the exposure of individuals and the overall population to radioactive materials;
 - restrict individual and population radiation doses to within the limits stated in the radiological assessment criteria;
 - minimise, to the extent practicable, contamination of the port and surrounding areas due to deposition of radioactive material; and
 - minimise, to the extent practicable, disruption of the normal use of the port and surrounding areas.

Information about the accident

7. The following information will assist in making a decision on the appropriateness of vessel removal following a reactor accident:

- a. The character and severity of the accident and the type and likely duration of the fission product release. There may be uncertainties associated with this information which can only be clarified by the Commanding Officer (CO) of the NPW.
- b. Meteorological conditions (wind speed, direction and atmospheric stability measure) prevailing at the time and forecast for the next six to 12 hours.
- c. The population distribution around the berth and along the removal route in relation to the meteorological conditions.
- d. Results of radiation measurements by the RMG.
- e. The state of the sea, shipping movements in port and along the removal route and, in the case of submarines, the availability of towing vessels.
- f. The CO of the NPW is not essential to the removal of a vessel, as other officers will be qualified to take command during emergency removal.
- g. A list of questions to put to the CO or Senior Officer of a NPW is given in appendix 2 to Annex D. The list is not exhaustive but should elicit sufficient information to assist local personnel in the implementation of local response measures.

Removal decision guidelines

8. The spectrum of possible accidents varies from those with no, or minimal, release of radioactive material to those with larger releases. The urgency for vessel removal will depend upon the rate of release of radioactive material to the atmosphere, the prevailing and forecast atmospheric dispersion characteristics, and the wind direction relative to the surrounding population.

9. In general, upon confirmation of an accident, the aim should be to remove the vessel to the designated remote anchorage or to sea as soon as possible consistent with the objectives outlined above. In some cases a decision to remove the vessel should be able to be taken immediately. However, under some circumstances it may be advisable to delay removing the vessel, such as where the passage of the vessel would have a potential for higher exposure of the population and tug crews than if the vessel were to remain at its berth, or where the likely release would be minimal.

10. In deciding when to direct vessel removal consideration should weigh the relative risks:

- a. to members of the public,
- b. to personnel engaged in the removal operation, and
- c. of potential impact on the port and surrounding areas.

A logic diagram to assist in making the decision to remove a vessel is given in figure 4D1-1 and specific information on individual ports is provided in part 2 to this Annex.

Responsibilities

11. Responsibilities associated with the decision to remove an NPW from port, and the flow of information between various groups is discussed below and summarised in table 4D1-1.

State/Territory authority responsible for the removal decision

12. The State/Territory authority responsible for deciding to remove an NPW from port should be identified in the Port Safety Plan or Visit Operation Order. The CO NPW should be advised of the directive by the Harbourmaster (HM) or representative (paragraph 17.) and the local naval authorities (paragraph 19.) are to activate the tugs.

13. The decision will be taken on the basis of advice provided by the SRO/TRO in liaison with the Leader Radiation Monitoring Group (LRMG), the CO of the NPW (CO NPW), the HM, the CO of the local naval establishment/Defence Representative and the Bureau of Meteorology (BOM).

State/Territory Radiation Officer/Leader Radiation Monitoring Group

14. The State Radiation Officer (SRO) will work in liaison with the LRMG. They should consult the CO NPW to gain information concerning the accident and the expected rate of release of radioactive material to the environment, and to seek views concerning removal of the vessel.

15. The results of surveys by the RMG will also provide information on the extent of the accident and may allow inferences about the rates of release of radioactive materials.

16. The CO NPW will be the person best positioned to provide technical information of the nature, severity and the possible course of the accident. Additionally, the CO NPW will be required to cooperate in the removal of the vessel.

Harbourmaster

17. The Harbour Master (HM) is the competent Australian authority responsible for directing removal of the NPW and also for controlling shipping movements within the port and its approaches.

18. The HM should be consulted concerning the state of the sea and shipping movements within the port and along the removal route. Care should be taken to ensure that shipping will not interfere with removal of the NPW or cause delays where significant exposures could result to the surrounding population.

Commanding Officer of the local naval establishment/Defence Representative

19. Tugs may be required for the removal of a submarine. The CO of the local naval establishment or Defence Representative, where there is no local naval establishment in the port, is responsible for activating the RAN Naval Pilots and tug crews. The Naval Pilots should be consulted concerning the practicality of towing the submarine in the prevailing conditions.

20. If the sea state was to make towing impractical, it is probable that the prevailing meteorological conditions would provide good dispersion and dilution of airborne radioactivity, so that removal would be less urgent.

Bureau of Meteorology

21. Wind speed and direction, and atmospheric stability, are major factors influencing the dilution and dispersion of radioactive material released during an accident and the resulting exposure of the public. In particular, stable atmospheric conditions with low wind speeds have the greatest potential for significant doses from airborne releases.

22. Prevailing meteorological conditions, and their forecast pattern in the hours following an accident, may influence the decision on when to remove the vessel. The meteorological pattern differs for each port and Port Safety Schemes make provision for ongoing advice on meteorological conditions.

23. Weather information will be available from the NPW and should be sought during the initial reaction to a reactor accident in addition to that provided by the BOM.

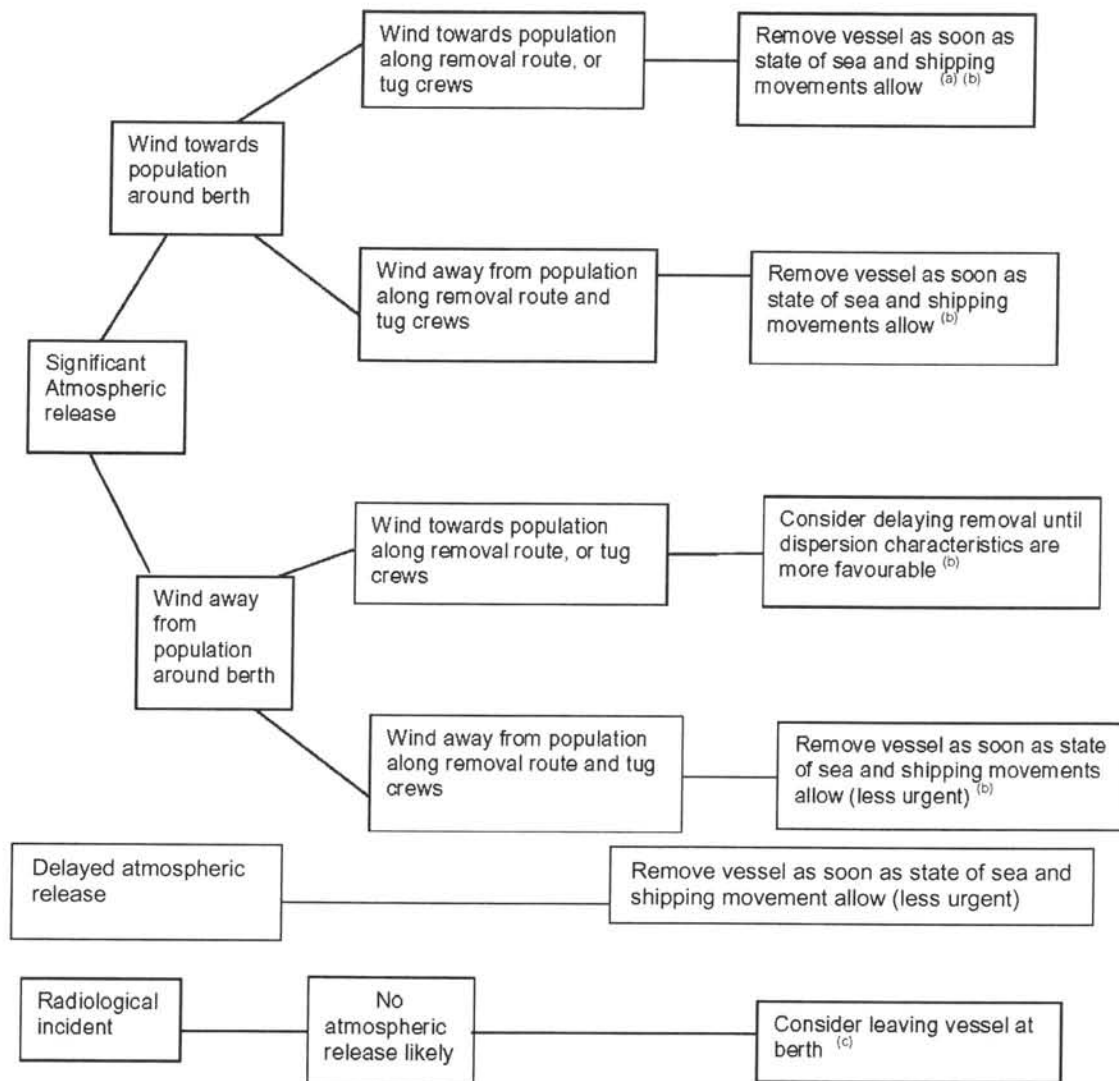


Figure 4D1-1: Logic diagram for vessel removal

NOTES

1. In general the exposure of the population during the transit of a vessel would be small and considerably less than might result if the vessel were to remain at its berth. This is due to the short time exposure and the diluting effects of the moving vessel.
2. Exposure to tug crews should be minimised to the extent practicable by choosing the removal path and time to avoid putting the tug in the path of the radioactive plume.
3. An incident might occur in which the release of radioactive fission products to the atmosphere is unlikely. Control of the incident might be better managed while the vessel remains at its berth. Such actions would be undertaken in consultation with the CO NPW.

OFFICER	INFORMATION	RESPONSIBILITIES
DSES/DTES	Seek advice from: <ul style="list-style-type: none"> • SRO/TRO in liaison with LRMG • CO NPW • HM • CO Local Naval Establishment (COLNE) 	<ul style="list-style-type: none"> • Deciding to move NPW • Instructing HM to require NPW removal • Instructing COLNE to implement removal of submarine by tug
SRO/TRO	Seek advice from: <ul style="list-style-type: none"> • LRMG on RMG survey results Advise DSES/DTES on: <ul style="list-style-type: none"> • Desirability of removing NPW • Preferred timing for NPW removal 	<ul style="list-style-type: none"> • Forewarn HM that removal of NPW may be required • Forewarn COLNE through DSES/DTES that tug may be required.
LRMG	Seek information from: <ul style="list-style-type: none"> • MMUs on: – radiation dose rates – field conditions • BOM on: <ul style="list-style-type: none"> ◦ prevailing atmospheric conditions, ◦ forecast atmospheric conditions. • CO NPW on prognosis of accident Advise SRO/TRO on: <ul style="list-style-type: none"> • Results of monitoring surveys, • Prognosis of accident, • Preferred timing for NPW removal 	<ul style="list-style-type: none"> • Direct MMUs before, during and after removal operation • Interpretation of RMG field monitoring surveys • Advise and assist SRO/TRO. • Oversee monitoring and protection of tug crew and shore party involved in vessel removal
CO NPW	Advise LRMG, DSES/DTES on: <ul style="list-style-type: none"> • Prognosis of accident • Prevailing atmospheric conditions 	<ul style="list-style-type: none"> • On instruction from HM: <ul style="list-style-type: none"> ◦ removal surface NPW, or ◦ assist with removal of submarine
HM	Advise DSES/DTES on: <ul style="list-style-type: none"> • Shipping movements <ul style="list-style-type: none"> ◦ in port ◦ along removal route • State of sea 	<ul style="list-style-type: none"> • Instruct CO NPW to: <ul style="list-style-type: none"> ◦ remove surface NPW, or ◦ assist in moving submarine • Control shipping movement: <ul style="list-style-type: none"> ◦ in port ◦ along removal route
COLNE	Advise DSES/DTES on: <ul style="list-style-type: none"> • Availability of tug • Practicality of towing submarine under prevailing conditions 	<ul style="list-style-type: none"> • Direct tug crew to: <ul style="list-style-type: none"> ◦ prepare to remove submarine ◦ tow submarine to designated anchorage
TUG CREW SHORE PARTY	Seek information from NPW on mooring and rigging details	<ul style="list-style-type: none"> • On direction from COLNE <ul style="list-style-type: none"> ◦ prepare to remove submarine ◦ tow submarine to designated anchorage
BOM	Advise LRMG on: <ul style="list-style-type: none"> • Prevailing atmospheric conditions • Forecast atmospheric conditions 	

Table 4D1–1: Responsibilities, information and actions

PART 2—INFORMATION FOR SPECIFIC BERTHS AND ANCHORAGES

24. Information on population distributions relative to vessel removal routes, and meteorology, is given below for individual ports, for use in conjunction with the logic diagram for decisions on vessel removal.

TASMANIA—HOBART

Population

25. The route from the approved anchorages to the remote anchorage passes between populated areas to the east and west of the Derwent River, with the majority of the population on the western shore.

Meteorology

26. The main winds are from the north and northwest, induced by the orientation of the Derwent Valley, which acts as a natural channel for the drainage of cold air at night. A high frequency of inversions with the onset of early evenings, particularly in autumn, are associated with these winds. They also give rise to fogs, particularly during winter months, which may persist until midday. The 9.00 am wind rose shows a strong prevalence of winds from the northwest with velocities generally less than five metres (m) per second.

27. Next in importance is the sea breeze from the south to southeast in the afternoons during summer months. These can also be associated with atmospheric inversion conditions, which result from the cooler air from the ocean moving in under the warm air cover of the landmass, in a convection pattern. The 3.00 pm wind rose shows velocities of the sea breezes generally to be greater than 5 m per second. Afternoon inversions resulting from sea breezes are less frequent, of shorter duration, and less stable than those associated with the night-time katabatic winds.

Comments

28. The approved anchorages in the Derwent River for NIMITZ class aircraft carriers and nuclear submarines are 3.5 km from the nearest land. This is also the boundary of Emergency Planning Urgent Protective Action Zone (UPZ) and represents the limit to which it may be necessary to implement protective measures to prevent radiation doses from exceeding the individual dose criteria if the vessel is moved within the maximum period permitted. These maximum periods are two hours for a NIMITZ class aircraft carrier and 6 hours for nuclear submarines.

WESTERN AUSTRALIA—HMAS STIRLING AND GAGE ROADS

Population

29. There are no populated areas in the vicinity of the routes from the approved berths and anchorages to the remote berth and anchorages.

Meteorology

30. Studies to the south of Fremantle indicate that stable atmospheric conditions occur less frequently than on the southeast coast of Australia. Once established, however, the period of persistence of stable conditions is similar at around 12 hours.

31. The BOM estimate that slightly stable conditions occur for about 13 per cent of the time, and moderately stable conditions for about 3.5 per cent of the time. During conditions of stability, winds tend to be faster than on the southeast coast. Wind speeds of less than 2 m per second occur less than two per cent of the time during stable conditions. These conditions occur almost exclusively at night and are seldom associated with winds, which would carry airborne contamination across the populated areas of the city.

Comments

32. At HMAS STIRLING exposure of the public should not be significant while the vessel is at its berth or during its removal, since the distance to the mainland is in excess of 5 km. Once the base has been evacuated of personnel the most relevant benefit from removing the vessel would be the protection of the base from radioactive deposition.

ALBANY

Population

33. Populated areas lie to the north of the initial part of the route from the approved anchorage to the remote anchorage.

Meteorology

34. Estimates of the likely frequency of atmospheric inversions and associated wind directions are not available. However, inversions would normally be expected to last for a few hours, starting in the early hours of the morning and breaking up at sunrise.

35. Seasonal and diurnal wind roses indicate that winds from the south-west are frequent (up to 35 per cent of occasions) throughout the year, and from June to November winds from the north-west are experienced on up to 40 per cent of occasions. Wind speeds in excess of 10 m per second are frequent. Calms are very rarely experienced during the daytime.

QUEENSLAND—PORT OF BRISBANE

Population

36. There are no populated areas in the vicinity of the route from the approved berths to the remote anchorage.

Meteorology

37. The BOM has provided information obtained from observations at Brisbane Airport.

38. The seasonal north-south oscillation of the sub-tropical high-pressure belt produces a generally southeasterly air stream over Brisbane during the warmer months and a mainly southwesterly stream in winter.

39. A fairly high frequency of inversion conditions can be expected in association with light winds at night, particularly during the winter months. Night-time winds are predominantly south to southwesterly throughout the year, with a fairly high proportion of calm conditions and light winds prevailing. This is generally a reflection of the basic wind field during the winter months and a land breeze effect during the summer months.

40. Winds tend to strengthen during the morning and by mid-afternoon the frequency of calm and very light winds is small. From September through to January northeasterly sea breezes predominate in the afternoons. Wind directions during other times of the year generally reflect the basic southwesterly or southeasterly fields. Higher wind speeds observed during daylight hours are indicative that stable atmospheric dispersion conditions are unlikely to persist past mid-morning.

PORT OF GLADSTONE

Population

41. There are no populated areas in the vicinity of the route from the approved berths to the remote anchorage.

Meteorology

42. Low level inversions are uncommon in the spring and summer months however, do occur in the late autumn and winter months. Inversions are most common in June and July. Generally the inversion will break up as the temperatures start to rise after sunrise.

43. The wind is mainly onshore throughout most of the year, with southeast to northeast winds predominating. During the spring, summer and autumn months morning winds are east to south east becoming east to northeast in the afternoon with the onset of the sea breeze. Overnight winds during these seasons are generally south to southeast. The winter winds are normally southeast to southwest, tending south to southeast in the morning and swinging round east to northeast in the afternoon. The wind strength generally increases in strength as the day progresses reaching a peak around mid to late afternoon. Calm conditions during daylight hours are uncommon.

Comments

44. The remote anchorage is approximately one mile north east of the berth.

NORTHERN TERRITORY—DARWIN

Population

45. There are no populated areas in the vicinity of the route from the approved anchorages to the remote anchorage.

Meteorology

46. Surface inversions at Darwin are mainly due to radiative cooling of the atmosphere during the night, starting soon after sunset, being established by 9.00 pm and clearing by 9.00 am the next day. The highest incidence occurs during the dry season and particularly from May to August with a 50 per cent occurrence during June and July. Winds are persistently southeasterly at this time of year and are usually of low velocity (about one to 2 m per second), but could exceed 5 m per second. There is little land and sea breeze effect.

47. Intense inversions lasting nearly 24 hours may occur two or three times from May to August. They are probably subsidence inversions, which arise when strong anticyclone conditions exist over South Australia and strong south-easterlies reach the Darwin area. Wind speeds may exceed 10 m per second.

48. Rainout could be an important dilution mechanism of atmospheric pollutants during the monsoonal wet season.

VICTORIA—PORT OF MELBOURNE

Population

49. The route from the anchorage to the remote anchorage is in a southerly direction away from the population.

Meteorology

50. Data collected from the State Electricity Commission at Fisherman's Bend indicates that stable atmospheric conditions, including inversions, exist for some 50 per cent of the time. The estimated duration of the inversions averages about 13 hours and they generally break up early in the mornings. Wind directions during stable night-time conditions are predominantly from the north to the northwest and away from the population. Afternoon immersion conditions may occur infrequently and have winds blowing from the south or southwest towards heavily populated areas.

NEW SOUTH WALES—JERVIS BAY

Population

51. There is no residential population within 1.2 km of the anchorage. HMAS CRESWELL and Australian Government territory is within 1.9 km of the anchorage. The removal route for the vessel is away from populated areas

Meteorology

52. Atmospheric inversions can be expected on about one in three nights during summer and one in two nights at other times of the year. They are associated with calm winds on about one in four nights and with light winds from the northeast quadrant about one in six nights. Winds from all other directions are rarely associated with surface inversions.

**QUESTIONS THE DUTY OFFICER OR OFFICER IN CHARGE (STATE
EMERGENCY COORDINATION CENTRE) SHOULD PUT TO THE COMMANDING
OFFICER OR SENIOR DUTY OFFICER NUCLEAR-POWERED WARSHIP IN THE
EVENT OF A REACTOR ACCIDENT**

1. The following are questions that should be asked of the Commanding Officer, or Senior/Duty Officer of a nuclear-powered warship (NPW) in which a reactor accident is suspected or known:

- a. could you provide some information on the character of the accident and its potential for major release of radioactive material?
- b. does the accident involve:
 - (1) a release of radioactive material outside the reactor cooling circuit.
 - (2) a release of radioactive material into the reactor compartment.
 - (3) Leakage of radioactive material outside the reactor compartment.
 - (4) Leakage of radioactive material into the environment.
- c. could you provide information on the expected development of the accident, and expected release of radioactive material over the:
 - (1) next hour,
 - (2) next four hours, and
 - (3) next 12 hours.
- d. are there any immediate or impending off-site emergency actions required to protect the Australian public?
- e. is it possible for the vessel to put to sea under its own power or is assistance from the Australian Navy tug required?
- f. do you need assistance from any Australian authorities to pick up injured or other ship's personnel?
- g. is it safe for Australian vessels to put alongside and are there any restrictions on their approach?
- h. how many casualties or crew need to be off-loaded from the vessel, and what is the extent and type of their injuries and contamination?
- i. could you advise of any local wind speed and direction information in the vicinity of the vessel?
- j. could you advise who will be handling the interfacing of your countries emergency response measures and press releases with Australian authorities?

ROYAL AUSTRALIAN NAVY ASSISTANCE TO THE RADIATION MONITORING GROUP

General

1. The Royal Australian Navy (RAN) will provide assistance to the Australian Nuclear Science and Technology Organisation (ANSTO) in meeting its responsibility for conducting radiation monitoring operations during the visits to Australian ports by nuclear-powered warships (NPW). The assistance is prescribed by the location, personnel requirements, role, tasks and support requirements detailed herein.

Location

2. The prescribed assistance will be provided at ports as follows:
- visits to Western Australia (HMAS STIRLING and Fremantle (Gage Roads)),
 - visits to other ports on a case-by-case basis as resources permit, and
 - for NPW at anchor, provision of a vessel for radiation monitoring.

Personnel requirements

3. Personal requirements are:
- technician(s) made available must be of the rank and category of Leading Seaman Electrical Technical;
 - personnel provided for radiation-monitoring duties may be of any rank or category.
4. Personnel are to have completed the requisite course training provided by ANSTO.

Role

5. The role of the technicians/radiation monitoring personnel will be to assist the Leader Radiation Monitoring Group (LRMG) in the routine and emergency functions of the Radiation Monitoring Group (RMG) during visits by NPW.

Note:

For NPW visit to HMAS STIRLING a fourth mobile monitoring unit (MMU), manned by RAN personnel will carry out measurements at HMAS STIRLING

Tasks

6. The specific tasks will be to:
- conduct routine radiation monitoring duties in conjunction with the LRMG (1–2 hours approximately daily); and
 - be on continuous (24-hour) call:
 - as a member of the MMU, and
 - to correct equipment or line faults.

Support requirements

7. The appropriate Commanding Officer (CO) of the local naval establishment/Naval Headquarters/Defence Representative in the port is responsible for:

- a. arranging the required technician and other radiation monitoring personnel in compliance with the local Port Safety Plan (PSP) (other RAN priorities permitting);
- b. ensuring the technician and other radiation monitoring personnel are immediately contactable at all times (preferably via a paging device);
- c. ensuring transport is readily available to deliver the technician and other radiation monitoring personnel 'on-scene' within 20 minutes of notification;
- d. notifying ANSTO of the name(s) of the nominated technician(s) and other radiation monitoring personnel at least seven days prior to the commencement of the NPW visit;
- e. arranging other service facilities required by the PSP; and
- f. arranging berthing/slipping parties if required, from available Australian Defence Force manpower.

Radiation monitoring vessel requirements

8. Where resources permit, the RAN will be responsible for provision of a vessel for radiation monitoring of NPW at anchor. Radiation monitoring of an NPW at anchor has two components. The first is continuous monitoring of the NPW whilst in port and the second, where appropriate, is mobile monitoring on water following a reactor accident. This responsibility can be achieved by either:

- a. provision of a dedicated radiation monitoring vessel which would station itself adjacent to the NPW and which may also become the mobile radiation monitoring vessel following a reactor accident; or
- b. arrange for the ANSTO radiation monitoring equipment and trained operator to be located onboard another vessel, such as a police security vessel, that will be stationed adjacent to the NPW.

9. If the latter option is used and the continuous radiation-monitoring vessel is unable to undertake post reactor accident mobile radiation monitoring, other arrangements to provide a response vessel should be planned. This situation would apply, for example, when a police security vessel is used for continuous radiation monitoring but has specific Precautionary Action Zone (PAZ) security and evacuation tasks following a reactor accident.

10. To satisfy RMG requirements for the early collection of mobile monitoring radiation data the following criteria for provision of a response vessel are desirable:

- a. the vessel is to be on stand-by with the mobile radiation monitoring equipment located onboard for the duration of the NPW visit;
- b. the vessel is to be equipped with radio/telephone communications, preferably fitted with Global Positioning System and radar; and
- c. the vessel is to be of sufficient size, performance and seagoing capability to fulfil its response role.

PROTECTIVE MEASURES—TOWING VESSEL CREWS AND NAVAL PILOTS

1. Specific safety measures are to be adopted by towing vessel crews to minimise radiation hazard when engaged in nuclear-powered warships (NPW) towing operations following a reactor accident.
2. The importance of the specific protective measures listed below could vary according to on-the-spot circumstances. However, the following protective measures should be observed:
 - a. The NPW only be approached from within a 30° angle of the bow or stern.
 - b. No approach is to be made within 200 metres of the beam of the NPW.
 - c. The downwind area of the NPW is to be avoided.
 - d. The time spent in the vicinity of the NPW is to be limited.
 - e. Prophylactic stable iodine tablets are to be taken by all personnel before approaching the NPW.
 - f. Protective clothing is to be worn by all personnel prior to the tug entering the PAZ.
 - g. Respirators are to be worn by all personnel prior to the tug entering then PAZ.
 - h. Personnel are to remain under cover as far as possible.
 - i. Eating, and smoking is to be prohibited. Personnel may consume water by following RAN CBRN procedures.
 - j. Individual dosimeters are to be worn by all personnel. For personnel required to be in the vicinity of the NPW, the dosimeters must be the digital alarm type. The alarm level will be determined by the Leader Radiation Monitoring Group (LRMG). If the alarm level is reached, the personnel are to retreat from the radiation area and consult the LRMG, who will advise on further action. Additional exposure of personnel may be required to complete emergency actions, but doses exceeding 100 mSv are not recommended.

PROTECTIVE MEASURES—SHORE PARTIES

1. Specific safety measures are to be adopted by shore parties (to minimise radiation hazard from a nuclear-powered warship (NPW) following a reactor accident) when engaged in slipping and/or attaching towing hawsers to effect a removal by a towing vessel.
2. The hazard from direct radiation from the vessel, particularly close to the reactor compartment, could be extreme and the actual radiation levels should be measured as any approach to the vessel is being undertaken. Radiation protection personnel should be available to undertake radiation measurements and to advise on the following protective measures to be observed:
 - a. the downwind area of the NPW be avoided;
 - b. prophylactic stable iodine tablets be taken by all personnel before approaching the NPW;
 - c. no approach within 200 metres of the beam of the NPW is to be undertaken unless under control of radiation protection personnel;
 - d. protective clothing and respirators are to be available and worn upon advice from radiation protection personnel; and
 - e. individual dosimeters are to be worn by all personnel. For personnel required to be in the vicinity of the NPW, the dosimeters must be the digital alarm type. The alarm level will be advised by the Leader Radiation Monitoring Group (LRMG). If the alarm level is reached, the personnel are to retreat from the radiation area and consult the LRMG, who will advise on further action. Additional exposure of personnel may be required to complete emergency actions, but doses exceeding 100 mSv are not recommended.
3. Personal protection packs for shore parties who may be engaged in casting off an NPW are also to be prepared and provided to the port visited on request of the area Naval Commanding Officer. Each pack is to contain: (for Defence Stock Numbers (DSN) refer to Annex H)
 - a. 6 x Detector RAD60;
 - b. 6 x Clothing outfit NBC Mk4A;
 - c. 3 pr each size Gloves Protective Outer CBRN and 3 pr each size Gloves Cotton inner CBRN, Size 8–8½; and 3 pr each size Gloves Protective Outer CBRN and 3 pr each size Gloves Cotton inner CBRN Size 9–9½;
 - d. 3 pr Overboot CBRN Size 10/11, and 3 pr Overboot CBRN Size 12/14; and
 - e. 6 x Full-face Lunguard 2 Masks DSN 4240-66-129-2015 c/w 1000 cc Canister; or 6 x Mask Protective CBRN S10 (3 Medium, 3 Large).
4. Personal protection packs for shore parties are to be located with, but marked to distinguish them from, those prepared for towing vessel crews.

TOWING VESSEL EQUIPMENT

1. When placed on stand-by for emergency nuclear-powered warships (NPW) towing duties, the towing vessels are to be equipped (as detailed below) to provide protective clothing, personal dosimeter equipment and stable iodine tablets for each member of the crew and Naval Pilot(s), as well as to carry radiation monitoring instruments. A simple system for wash down of the decks and superstructure is also required. The towing vessel is to be provided with radiation detectors provided by ANSTO, sufficient stable iodine tablets for all embarked personnel and sufficient personal protection packs for each member of the crew.

2. Personal protection packs are to be prepared and are to contain the following items:

- a. SOR/T (personal device), XOM/T (reader);
- b. 1 x Clothing Outfit NBC Mk4A DSN 99-813-7999, 99-891-0823, 99-958-4989
- c. 1 pr Gloves Rubber NBC DSN 8415-99-130-9431 (size 8 small)/9432 (size 9 medium)/9433(size 10 large)/ 9434 (size 10 1/2 large), 2 pr Gloves Cotton NBC DSN 8415-99-975-7914 (size 8-8 1/2 small)/7915 (size 9-9 1/2 medium)/7916 (size 10-11 large);
- d. 1 pr Boots Knee Rubber DSN 8430-66-076-7618 (small)/20 (large) (Note 3); and
- e. Full Face Lunguard 52 DSN 4240-66-129-2015 c/w convolute hose, harness Protector Part Number RFF 52 znc 1000 cc Canister 'AAEC', or Mask Protective NBC S10 DSN 4240-00-926-4199 (small)/201 (medium) Cannister NSN 21-912-5397(Notes 3, 4 and 5).

Notes:

1. Radiac Computer for TLD to be retained ashore by Royal Australian Navy (RAN) Radiation Monitor.
2. Glove DSN quoted are medium (8-8 1/2) and large (9-9 1/2).
3. Items come in three sizes—small, medium and large.
4. Unless a more suitable item is available and recommended by the Australian Nuclear Science and Technology Organisation.

3. Packs are to be made up in varying sizes to fit individual crew members. Where towing vessel crews are drawn from a 'pool' of sailors, equal numbers of medium and large sizes should be made up. The packs should be held in an easily accessible stowage area for issue to the crews.

4. Collective protection packs containing equipment to support two vessels and 20 crew members (10 each) are required. The Commanding Officer of the local naval establishment/Defence Representative will draw these packs when a NPW visit is confirmed.

5. Specifically each collective protection pack is to contain:

- a. 1 x Graetz Dose Rate Meter X50B DSN 6665-66-129-0391;
- b. 1 x Radiac Computer CP-95Z/PD DSN 6665-00-526-8645;
- c. 1 x Dosimeter Charger DSN 6665-99-109-5335;
- d. 1 x Digital Alarm Dosimeter Model 06-505 DSN 6665-LP-000-1873 (or similar);
- e. 200 x stable iodine tablets; and
- f. 12 x personal protection packs.

6. Personal protection packs also must contain the equipment listed in paragraph 2. These packs should be made up with equal proportions of medium and large size boots. If RAN personnel are detailed, and if the Mask Protective NBC S10 is used (see Note 4), crew members are to provide the mask with which they have already been issued. Lunguard RFF 52 masks are suitable for all head sizes.

PORT SAFETY PLAN GUIDE

General

1. This Annex provides a guide to the preparation of Port Safety Plans and Visit Operation Orders/Instructions. These plans are developed by, and are the responsibility of, State/Territory Governments. The Port Safety Plan details the responsibilities of State/Territory authorities during all phases of nuclear-powered warships (NPW) visits. The Visit Operation Order/Instruction specifies detailed arrangements for the visit of each particular vessel. The content of these documents will vary depending on each particular State/Territory organisation and legislation. However, there are common requirements which should be addressed in these plans and they are described herein.

PORT SAFETY PLAN

Structure

2. The structure of the plan should address the following topics:
- background information;
 - introduction, facilities;
 - State/Territory organisation, including links to other applicable State/Territory plans;
 - procedures; and
 - radiation monitoring.

Background information

3. This section should include information related to the nature of the problem to allow planning personnel sufficient background to understand the need for the procedures that are adopted, particularly those to be followed in an emergency.

Introduction

4. This section should identify:
- the authority for the plan (legislation and authorisation/ratification by the appropriate authority);
 - related documents, including sub plans and other applicable plans);
 - the format of the plan; and
 - the relationship between the plan and its associated operation order/instruction.

Facilities

5. The port's approved berths and anchorages should be identified in this section. Supporting services such as marine authorities, wharf services, security, communications, depths of water, fendering, sullage etc are also to be detailed.

Organisation

6. All relevant State/Territory authorities, committees and operations staffs should be identified in this section, together with contact details (normal and out of hours). Functions and responsibilities of, as well as liaison channels between, supporting organisations are to be clearly identified. This includes the relationship with Australian Government bodies.

Procedures

7. This section should describe the details of those procedures that are to be used during normal and emergency situations. The stages of activation of the Plan should be clearly identified, and, for ease of reference, action tables are recommended. These tabulate the duties of each authority, responsible officers and the action to be completed. The required safety zones should be clearly set out along with their responsible personnel.

8. Relevant Annexes to this section would be the:

- a. evacuation plan,
- b. communication plan,
- c. meteorological report format,
- d. pre-planned media announcements, and
- e. issue of stable iodine tablets

Security

9. Physical security requirements will vary from visit to visit, based on the assessed threat from anti-nuclear or, less likely, terrorist organisations. In addition to the physical waterborne and land-based patrols, consideration should be given to issuing a Notice to Airmen, effectively restricting access for overflight within a proscribed radius and to a predetermined height around the berth or anchorage.

Closure of airspace

10. Immediately following a confirmed alarm, a Notice to Airmen should be issued, closing airspace within Urgent Protective Action Zone (UPZ) and in the downwind sector of Long Term Protective Action Zone (LPZ), to a height and distance dependent on the prevailing meteorological conditions.

Radiation monitoring

11. While the need for radiation monitoring should be briefly addressed in the background information section, it is preferable to keep all aspects of this task within one section, since monitoring can and should be treated as a separate function in support of the overall response organisation for a NPW visit.

12. The scope of this section should address the radiation monitoring requirement and the State/Territory's procedures and organisation for provision of support to that provided by the Australian Government. The authority and responsibilities of the State/Territory Radiation Officer should be clearly identified as well as the composition of, and contact details for, all monitoring personnel and support staff.

13. Appropriate Annexes should include:

- a. a table and chart describing thermoluminescent dosimeter locations, and
- b. radiation-monitoring report format.

Visit Operation Order

14. A Visit Operation Order should be issued for each particular NPW visit. This will support the Port Safety Plan but will provide operational and administrative details specific to that visit.

Content

15. A typical Visit Operation Order/Instruction would contain:

- a. a summary of the NPW's characteristics,
- b. the visit timetable,
- c. the location of the fixed radiation monitoring post,
- d. details of the port emergency communications net,
- e. a personnel contact directory, and
- f. personnel rosters.

Maintenance of plans

16. All NPW safety plans are to be kept under regular review in order to maintain their currency. The Attorney-General's Department, Emergency Management Australia and Headquarters Joint Operations Command hold copies of all State/Territory plans, which are kept current by attaching all amendments thereto. Should these amendments have national application or be considered to be in the interests of better planning for all affected Australian organisations, they should be submitted to AGD EMA, for consideration by the Visiting Ships Panel (Nuclear) (VSP(N)).

Post-accident recovery

17. Guidance for establishing the extent of contamination and its characteristics, collection of environmental samples, advice on longer term recovery are contained in the VSP(N) *Environmental Monitoring Handbook for Visiting NPW Warships*. Post accident recovery would be conducted in accordance State/Territory HAZMAT Plans.

**AUSTRALIAN NUCLEAR SCIENCE AND TECHNOLOGY ORGANISATION
EMERGENCY SUPPORT EQUIPMENT****GENERAL**

1. In the event of a reactor accident, the full objectives of the radiation-monitoring requirement may not be achieved solely by the on-scene radiation-monitoring group. Following the immediate period of monitoring, extensive environmental radiation surveys of affected areas may be needed before normal activities could be resumed; this could take several days.
2. Additional equipment and personnel would therefore be required in addition to that deployed for a routine visit. The additional resources would be used to:
 - a. determine the extent of decontamination required,
 - b. monitor foodstuffs that may be affected,
 - c. provide assurances that evacuated areas can be reoccupied, and
 - d. provide assurances that normal activities may be resumed in affected areas.

Royal Australian Air Force support

3. Because of the size and immediacy required of the resources, Air Command will maintain a suitable aircraft (at four hours notice) to airlift the equipment and personnel to the affected area.

Resources

4. The equipment held by the Australian Nuclear Science Technology Organisation consists of a Vehicle, 10 aluminium trunks. Up to 12 personnel may be required to travel with the equipment. Details of the equipment are:

Item/Number	Weight loaded (kg)	Dimensions (m)
Vehicle	< 2000	< 4.0 x 4.0 x 4.0
10 aluminium trunks	42	0.75 x 0.45 x 0.4

Movement

5. During all NPW visits the equipment and personnel are available at Lucas Heights Science and Technology Centre. On notification, the personnel and equipment will deploy to the Royal Australian Air Force (RAAF) Base Richmond for loading at the Air Movements Section. The RAAF aircraft will concurrently deploy, load and proceed to the nearest airfield to the affected port. These arrangements should make the resources available eg in Western Australia within 12 hours.

INTERACTION WITH THE PUBLIC AND MEDIA

1. It is essential that the Port Safety Organisation for nuclear-powered warship (NPW) visits include arrangements for dealing with inquiries from the public and from the media in the event of a reactor accident in a visiting NPW.
2. Use of the media (television, radio and newspapers) in informing the public of the accident and emergency reactions is essential to planning for NPW visits. However, it is essential that the correct and exact message is passed without the use of emotive or imprecise words or expressions, which may create panic or other difficulties. To this end it is essential to include prepared releases in the Port Safety Plan which will then require only the insertion of the name of the NPW, dates times and other details to suit the situation.

CHAPTER 5

REQUESTS AND ROUTINE ARRANGEMENTS FOR VISITS

VISIT REQUESTS

General

5.1 To obtain approval for the visit of a nuclear-powered warships (NPW), the relevant diplomatic mission will seek the Australian Government's agreement through a request passed, at least six weeks before a proposed visit, to the Department of Defence (Maritime Operations (MAROPS)) for consideration by the Visiting Ship's Panel (Nuclear). A recommendation is made by the VSP(N) for subsequent decision by the Minister for Defence through MAROPS. The Department of Defence conveys the Minister's decision and any conditions or restrictions that may apply during the visit to the diplomatic mission. State/Territory Governments are informed of the visit request and Ministerial decision by Attorney General's Department, Emergency Management Australia (EMA AGD).

5.2 When diplomatic clearance for a particular ship visit is passed to the requesting nation's diplomatic mission, details of the position of the specific berth/anchorage and the remote anchorage to be used during the visit and any special removal requirements for that berth/anchorage are to be included if known.

ROUTINE ARRANGEMENTS FOR VISITS

Port Safety Organisation

5.3 During all visits by NPW to ports under the jurisdiction of State/Territory authorities, the State/Territory will activate and control the operation of a Port Safety Organisation to initiate the actions and provide the services necessary to safeguard the public in the event of a reactor accident. Relevant Australian Government departments will be available to provide assistance if required. The Royal Australian Navy (RAN) will implement and control safety plans for those ports under its control (Jervis Bay and HMAS STIRLING).

Radiation monitoring

5.4 During all visits by NPW, the Australian Government, with State assistance where available, will provide radiation-monitoring services to detect any accidental discharge of radioactivity into the environment. Radiation monitoring is to be conducted in accordance with the guidelines stated in Chapter 3. The Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) will provide environmental monitoring as detailed in Chapter 4. Where possible the RAN is to provide assistance as detailed in Annex E to that chapter.

Security

5.5 Security will be provided by:

- a. Defence Security Authority (DSA) (Assistant Director Security—Intelligence) will liaise with Australian Security Intelligence Organisation for an initial threat assessment to be issued to HQJOC and AGD EMA at least three weeks before the arrival of each NPW. Assessment updates will be issued as necessary.
- b. In the event that a security threat is identified which requires a nationally coordinated response, AGD EMA will take carriage of the response. For lesser threats, DSA will be responsible for coordinating advisory action to the DSA Regional Security Office and the Provost Marshall—Navy (PM-N) who will liaise with State/Territory police regarding the appropriate security response.
- c. The control of public movement and maintenance of public order outside military establishments will be conducted by State/Territory Police.

5.6 Advice of an NPW visit is usually classified until the Diplomatic Clearance has been granted. Declassification details for each particular visit will be advised by the Department of Defence.

Open days and visitors

5.7 Traditional 'open days', where the general public is allowed onboard, are not permitted for NPW or vessels berthed alongside a NPW. This does not exclude visits by organised groups and private guests.

5.8 The responsibility for evacuation of visitors rests with the State or Territory Director of Emergency Services (DSES/DTES), or the authority responsible for all aspects of the Port Safety Plan (PSP). In order to provide full accounting for visitors in the case of an evacuation a register should be maintained and be available to the DSES/DTES.

Reports

5.9 The Department of Defence and AGD EMA are to be kept informed of the progress of each NPW visit by the Commanding Officer (CO) of the local naval establishment/Defence Representative in the port or State/Territory jurisdiction as appropriate. In particular they are to report any incident of note occurring prior to or during a visit involving:

- a. public reaction or media comment,
- b. security, and
- c. provision of supporting services.

Visit clearance action

5.10 When notified of a visit request, the VSP(N) will consider the necessary practical arrangements; in particular, the VSP(N) will:

- a. Through the National Port Services Organisation:
 - (1) confirm the availability of the appropriate berth/anchorage;
 - (2) confirm the availability of Naval Pilot(s);
 - (3) confirm the provision of emergency towing arrangements for single reactor vessels and multi reactor vessels (when berthed alongside);
 - (4) confirm the provision of a radiation monitoring vessel for NPW at anchor; and
 - (5) consider the detailed visit program to determine if any proposed activities are incompatible with radiological safety requirements.
- b. Confirm the availability of:
 - (1) The Port Safety Organisation (through A-GD); and
 - (2) the mobile monitoring units (through ANSTO).
- c. through A-GD, advise the Premier's/Chief Minister's office and the Director of the Emergency Service of the State/Territory concerned.
- d. through Defence inform Defence Security.
- e. through MAROPS inform the EMA AGD
- f. Inform the ARPANSA; and
- g. Forward a recommendation on visit approval to MAROPS.

Organisational responsibilities

5.11 The responsibilities for the conduct of routine arrangements prior to, during and after the visits of NPW are shared between Australian Government and State/Territory authorities.

Department of Defence

5.12 Defence is responsible for:

a. MAROPS:

- (1) Through the VSP(N), conducting the consultations required to obtain approval for the visits.
- (2) Generally overseeing arrangements made by the various authorities to ensure that all the appropriate safety arrangements are in place.

b. Defence:

- (1) Arranging the preparation of a threat assessment for each visit in accordance with paragraph 4.5.
- (2) Liaising with EMA AGD and, through DSA Regional Security Offices and PM–N State/Territory authorities as appropriate to the level of threat.

c. Royal Australian Navy:

Through the National Port Services Organisation, CO or Senior Naval Officer of the local naval establishment or Defence Representative in the port for:

- (1) arranging port and berthing facilities;
- (2) arranging the Naval Pilots;
- (3) coordinating arrangements for visits as may be required by VIPs, in consultation with Federal and State/Territory police as appropriate;
- (4) providing appropriate and adequate ship-to-shore transport and other auxiliary support;
- (5) preparing the PSP for ports under RAN control and ensuring the implementation of the Naval Nuclear Ships Safety Organisation and pending the agreed level of assistance at civilian ports to State/Territory Governments required in their PSP;
- (6) arranging tugs to provide the emergency towing capability for visiting single reactor vessels and multi reactor vessels (when berthed alongside); and
- (7) providing a vessel for radiation monitoring of NPW at anchorages; and
- (8) For visits to HMAS STIRLING, provision of an additional mobile monitoring unit

d. Air Headquarters:

- (1) Providing air support for the transportation of emergency support equipment (in accordance with chapter 3, Annex J).
- (2) Providing air transport of early warning radiation monitoring equipment and other equipment to NPW visit ports using scheduled flights if requested by ANSTO and ARPANSA.

e. Local Defence Representative:

- (1) media releases, in consultation with the appropriate local Senior Naval Officer.
- (2) in ports not served by a conveniently situated naval establishment, undertaking the responsibilities listed in subparagraph g. below.

f. Local Naval establishment or Naval Headquarters:

- (1) liaising with State/Territory authorities as required by Port Safety Organisations;
- (2) arranging assistance to radiation monitoring teams (in accordance with Annex E to chapter 3);
- (3) coordinating appropriate visit support; and
- (4) arranging service berthing parties if required, from locally based personnel.

Australian Nuclear Science and Technology Organisation

5.13 ANSTO is responsible for:

- a. provision of advice related to all aspects of radiation monitoring;
- b. conducting radiation-monitoring operations, in cooperation with State authorities, ARPANSA and the area Naval Officer Commanding;
- c. developing, maintaining and, as required, providing and installing, appropriate and adequate equipment for routine and emergency radiation monitoring;
- d. providing leadership and training of radiation monitoring teams, and pre-visit exercises of the emergency response plan; and
- e. providing emergency radiation monitoring equipment and appropriate personnel as required in the event of a reactor accident.

Department of Health

5.14 The Department of Health is responsible through ARPANSA for:

- a. provision of technical advice on all aspects of nuclear reactor safety matters,
- b. provision of technical advice on nuclear reactor accident modelling,
- c. assessment of the suitability of specific ports for visits by NPW against radiological criteria, and
- d. provision of advice on radiation protection and monitoring requirements.

Australian Radiation Protection and Nuclear Safety Agency (ARPANSA)

5.15 ARPANSA is also responsible for:

- a. participation in environmental radiation monitoring operations and performing analyses of samples as required;
- b. provision of passive dosimeters to State authorities and RAN tug crews;
- c. participation with ANSTO and State/Territory in the analysis and assessment of post-accident radiation monitoring data;
- d. providing Australian Government Technical Advisers as required; and
- e. in the event of a reactor accident having available back-up emergency monitoring equipment and personnel to support the State/Territory with longer term post accident monitoring and recovery.

Department of the Prime Minister and Cabinet

5.16 The Department of the Prime Minister and Cabinet is responsible for providing the contact between Australian Government and State authorities on matters of policy, which may arise in relation to NPW visits.

Department of Foreign Affairs and Trade

5.17 The Department of Foreign Affairs and Trade is responsible for conducting formal exchanges with the representatives of diplomatic missions requesting and conducting NPW visits. The Department may also provide advice on foreign policy considerations relevant to a proposed visit.

Emergency Management Australia, Attorney-General's Department

5.18 The Attorney-General's Department, Emergency Management Australia is responsible for:

- a. the coordination of Australian Government security arrangements when a threat is identified which requires a nationally coordinated response;
- b. assisting with the development and maintenance of State/Territory Plans through the VSP(N) Technical Working Group (TWG);
- c. liaising with the appropriate jurisdiction on port validation issues;
- d. assist in the compilation of post exercise reports, through the TWG, for the Chairman of the VSP(N);
- e. advising the Premier/Chief Minister's office via the Director of the State/Territory Emergency Service of forthcoming NPW visits. Initially by a sanitised message (port and visit dates) requesting that the PSP be activated. Advising full details when the visit is declassified;
- f. Through the appropriate State/Territory instrumentality, confirming the availability of the Port Safety Organisation for each NPW visit; and
- g. Coordinating Australian Government physical assistance to State authorities in the event of a reactor accident.

State/Territory Governments

5.19 State/Territory Governments are responsible for:

- a. the preparation of PSP for the visits of NPW for those ports under their control;
- b. issuing instruction for, and operation of, a competent Port Safety Organisation during the visit of a NPW;
- c. advising the Chairman VSP(N) of changing local factors, such as land use and population changes, which may effect the currency of NPW berths and anchorages, or approaches thereto; and
- d. through the Australian Maritime Safety Authority issuing an appropriate Danger to Navigation message, giving details of intended NPW movements in the port approaches.

Public information

5.20 The local authorities will issue the visit press release on the day before arrival of an NPW. Appropriate local naval and civilian authorities should be consulted on the matter of timing and content. The Department of Defence is to be consulted if it is considered that an earlier release is appropriate.

GLOSSARY

Annual Radiation Monitoring Report

Report on the results of Marine Sampling and Environmental Monitoring conducted before, during and after NPW visits. The report is presented in Parliament and circulated to Australian Government, State and Territory authorities concerned with NPW visits, and libraries etc.

Primary Port

Is a validated port for NPW visits.

Secondary Port

Is a validated port for short duration visits (less than two hours) for Stop and Go type visits, for example: medical emergencies.

Reference Accident

Accident scenario upon which port radiological assessment and response planning is based.

Removal time

There must be a capability to remove the vessel, either under its own power or under tow, to a designated safe anchorage or a designated distance to sea as soon as possible within the time frame specified for the particular berth or anchorage.

ACRONYMS

ADF	Australian Defence Force
ADS-INT	Assistant Director Security—Intelligence
AGD EMA	Attorney-General's Department, Emergency Management Australia
ANSTO	Australian Nuclear Science and Technology Organisation
ARPANSA	Australian Radiation Protection and Nuclear Safety Agency
BOM	Bureau of Meteorology
COLNE	Commanding Officer Local Naval Establishment
CTA	Australian Government Technical Adviser (a senior radiation protection officer—the CEO ARPANSA or delegate fulfils this role)
CVN	Aircraft Carrier (Nuclear propulsion)
DSA	Defence Security Authority
DSEC-OPS (INT)	Director of Security Operations (Intelligence)
DSES and DTES	Director of State Emergency Services or Director of Territory Emergency Services
GPS	Global Positioning System
HMAS	Her Majesty's Australian Ship (A warship of Australia (RAN))
HMS	Her Majesty's Ship (A warship of the United Kingdom (Royal Navy))
HQJOC	Headquarters Joint Operations Command
ICRP	International Commission on Radiological Protection
LRMG	Leader Radiation Monitoring Group (a suitable officer deployed to cover an NPW visit)
LSET	Leading Seamen Electrical Technical
MA	Master Attendant (RAN Officer responsible for Port Services nationally)
MAROPS	Maritime Operations
MMU	Mobile Monitoring Unit (a component of the RMG)
AGCCC	Australian Government Crisis Coordination Centre (EMA in Canberra)
NIMITZ Class	A US Navy Nuclear Powered Aircraft Carrier Class (CVN)
NNSSO	Naval Nuclear Ships Safety Organisation
NPW	Nuclear-powered Warship
NPWV	Nuclear-powered Warship and other Foreign Ship Visits
NPWVC	Nuclear-powered Warship Visits Committee
NHQ	Naval Headquarters in Brisbane and Hobart
PM-N	Provost Marshal—Navy
PSP	Port Safety Plan (Contingency plan drawn up by State/Territory authorities providing the policy and arrangements for NPW visits)
RAN	Royal Australian Navy
RMG	Radiation Monitoring Group
RN	Royal Navy
SSN	Attack Submarine (Nuclear propulsion)
SRO	State Radiation Officer
TECHRMG	Technician Radiation Monitoring Group, a Australian Government Officer ANSTO or RAN
TRO	Territory Radiation Officer
TWG	Technical Working Group of the Visiting Ships Panel (Nuclear)
UNSCEAR	United Nations Scientific Committee on the Effects of Atomic Radiation
USN	United States Navy
USS	United States Ship (A warship of the United States of America)
VOO	Visit Operations Order prepared by the local NPW visits committee
VSP(N)	Visiting Ships Panel (Nuclear)